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Municipal Auditorium, Springfield, Tuesday, June 9, 1936

PRESIDING:
Dr. E. Parker Hayden, Boston, Chairman.
Dr. Frederick S. Hopkins, Springfield, Secretary.

CHAIRMAN HAYDEN: *Gentlemen*—The first paper is to be given by Dr. William E. Browne on "The Necessity for Use of Splints at Certain Stages in the Treatment of Infections of the Hand, with a Demonstration of Some of the Newer Types."

THE NECESSITY FOR USE OF SPLINTS AT CERTAIN STAGES IN THE TREATMENT OF INFECTIONS OF THE HAND, WITH A DEMONSTRATION OF SOME OF THE NEWER TYPES*

BY WILLIAM E. BROWNE, M.D.†

I AM grateful for the time which has been allotted to me this morning to review certain well-known, and perhaps at times somewhat forgotten, facts which are highly important in the treatment of infections of the hand. The benefits obtainable by the use of various forms of splints, and certain splints designed within the past year, will be presented for your consideration.

When one considers the anatomy of the hand, the numerous spaces in which infection may occur, the various pathways through which infections spreads, scar tissue formation which develops after infection in muscles, tendons and ligaments, one is at times surprised that we do not have a greater percentage of crippling deformities in the hand, after infection, than we do at the present time.

In order to understand the reasons for the use of various mechanical devices and splints of one kind or another, it is necessary to know, in a general way, the functions of the muscles and tendons in the hand. Without being too technical, it is perhaps correct to say that, excluding the thumb, the main functions of the other fingers of the hand are flexion and extension of ginglymoid joints. It is at once obvious, however, that the combined motions permissible in the metacarpophalangeal articulations, amounting practically to circumduction, are more than the action obtainable in a hinge-joint. One is not greatly in error, however, when one says that the ability to close the fingers, so that the tips of the fingers normally come in contact with the palm of the hand, and the ability to extend the fingers in nearly a straight line, comprise the chief motions of the fingers. The thumb is perhaps the most important part of the hand. It aids each finger in its own individual action, and aids all of the fingers working together.

Dr. Allen B. Kanavel has twice been good enough, within the past few years, to come to our clinic at the Carney Hospital and speak upon some phases of disease and injury, as they affect the human hand. His excellent work on infections of the hand should be among the books of every physician who is called upon to treat injuries and infections of this very important anatomic structure. When in Chicago, one would do well to visit the Passavant Hospital and observe the work done by Dr. Kanavel's associates, Drs. Sumner Koch and Michael Mason. Their work in the operating room is most instructive, but not more so than the highly important postoperative care, the dressings carefully applied, splints ingeniously used, and motions based on physiologic principles carried out.

On each occasion when Dr. Kanavel visited our hospital, he stressed the functional activities of the hand. He considered the hand, first, in its normal resting position, and then showed the reasons why infections diminish, or at times entirely prevent, the actions of various parts of the hand, or the hand as a whole. Obviously, it is necessary, for one attempting anything more than so-called ordinary surgical procedures in the hand, to have a detailed knowledge of the structures which enter into its formation. A knowledge of the layers of the skin, for example, is important in considering various types of skin

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graft which are used so much today in the treatment of contractures. The three main nerves must be clearly understood, and one must, from long time spent in the anatomy laboratory, have a clear mental picture of the surface markings and terminal pathways of the median, ulnar, and musculospiral nerves. Certain very important points must be borne in mind, with reference to these nerves, by anyone who is called upon to treat an ordinary laceration of the hand or wrist.

In the ordinary course of general practice, one sees various injuries, and should have certain dependable methods by which an examination may show what, if any, important structures of the hand have been injured. When, for example, the porcelain handle on a water faucet breaks and cuts the hand, not infrequently the median nerve supply to the flexors of the thumb, and one or both flexors, may be divided. Just beneath the palmaris longus tendon, when it is present, lies the median nerve, seldom much over one-quarter inch beneath the surface of the skin, at the wrist. The ulnar nerve is the most important nerve supply to movable soft parts of the hand. The most important branch of the ulnar nerve, as it crosses the anterior annular ligament, is very close to the surface of the base of the hand, and seldom if ever farther away than one-quarter inch from the skin surface close to the styloid process of the ulna, or the pisiform bone. Before considering any form of splint on which the hand may rest comfortably, one should first of all be sure whether there has been interruption in the continuity of these nerves as the result of accident, or from other causes.

If one is able to separate the fingers, and to adduct the fingers, and if the patient can adduct the thumb so that the tip of the thumb touches the palmar surface of each metacarpophalangeal joint, then the ulnar nerve, in all probability, has not been injured. If the patient touches the tip of the thumb to the tip of each finger, and if the lumbrical muscles of the index and mid fingers function normally, then the median nerve has probably not been injured. If sensory reactions on the dorsal aspects of the first and second segments of the hand, or the thumb and index finger, are normal, then in all probability a wound near the wrist has not interfered with the radial nerve. These rules are very simple indeed and must be remembered in an examination of the hand.

Most physicians may in their experience, without any difficulty, well recall flexion deformities which usually develop very insidiously. These deformities, in a large part, may be prevented by the proper use of some form of splint. It is natural for the unaided, badly infected finger to assume a position of flexion, because at rest the fingers are normally held in a somewhat flexed position. The flexor structures in a finger outnumber the single extensor structure usually by three to one. When the process of repair starts, after infection has damaged the finger, and if the finger has been allowed to remain in a position of too great flexion, then scar tissue formation, which takes place under the bed in which the tendon sheath lies — the so-called phalangeal annular ligament — seriously restricts the use of a finger. If, in infections lasting as short a period of time as two weeks, some form of splint is not used to hold the thumb abducted, with the palmar surface of it facing the rest of the hand, very often adduction deformities occur, tremendously restricting activities of the thumb and interfering with actions of the other fingers. Resting an infected hand on a properly padded straight splint is perhaps better than the use of no splint at all. If, however, the thumb, on such a splint, is held close to the rest of the hand, with the palmar surface of the thumb facing downward, restriction of motion in this most important part of the hand very quickly follows.

Bearing in mind that which has already been mentioned and which cannot be mentioned too often, namely, the normal position of the hand at rest, one readily sees the necessity for the use of some form of cock-up splint, some apparatus which prevents the extensor tendon being drawn down by the contracting powerful flexors, with perhaps a resulting so-called claw-hand. In nearly every form of cock-up splint, some provision must be made for holding the thumb abducted. At rest, the thumb is held about halfway between full abduction and complete adduction. It is desirable, in placing the hand on a splint, to hold the thumb in a position of about three-quarters complete abduction.

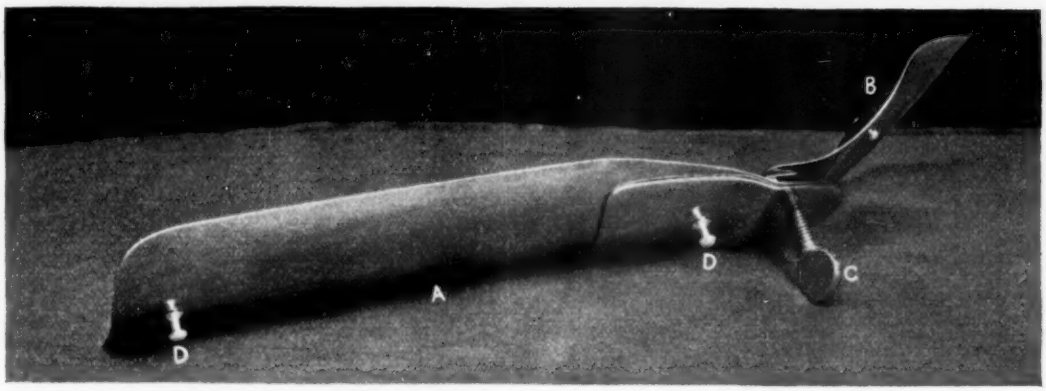
If the doctor has reason to believe that a badly infected hand may possibly become permanently stiff, then some device should be used so that the end-result, if it be a crippled hand, will be one capable of some use. If the end-result finds the thumb adducted not far from the index finger, and if the index finger has become nearly rigid, in a straight-angle, it is at once obvious that these two most important parts of the hand have become nearly useless. It seems at times that no matter what one does, an entire hand, after a so-called trivial accident with ensuing infection, becomes entirely stiff because of tendon destruction. In cases of this kind, one notes that frequently such results follow infections which develop from a type of puncture wound, such as the entering of a splinter of wood, or some other material, into any part of the hand. It is very natural for one to forget details as to the

structures of the hand. It is not difficult, however, to bear in mind certain points with reference to the anatomy of the hand, which must not be forgotten. On the palmar surface of each finger are two crease marks. These creases in the skin are the surface markings of unprotected tendon sheaths below. Injuries to the fingers close to these crease marks, with or without ensuing infection, not infrequently cause serious trouble. An injury on the palmar surface of a finger, or the palmar surface of any part of the hand, that results in infection is much more likely to cause serious trouble than lesions on the dorsal aspect of the hand.

It is necessary to bear in mind the closed spaces within the hand. There are several

sion or hyperextension of an infected thumb, which results in pain in the little finger or hypothenar eminence, not infrequently indicates that the infection has gone from the thumb side of the hand through into the closed space on the little finger side of the hand, which closed space extends out well on to the palm. One other closed space should be mentioned, and that is the one in relation to the flexor carpi radialis tendon.

It is difficult to recall the poor results that I have had in the past years, and not to mention, even in this short paper, some of the causes of those poor results, and methods used to prevent them. If time permitted it might be helpful to say a word, in conjunction with the use of splints, to describe incisions used for the



SPLINT NO. 1.
Simple splint with cock-up attachment at wrist.
A. Forearm attachment.
B. Hand attachment.
C. Thumbscrew.
D. Little pivots for attaching straps.

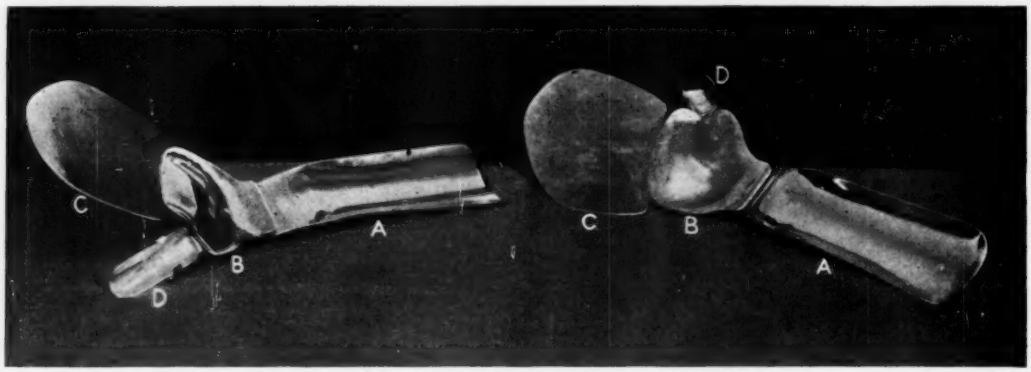
such spaces, the details of which are quite difficult to remember, but an everyday, practical knowledge of these spaces is not difficult of attainment. Briefly, the index, middle, and ring fingers have closed spaces in which infections often occur, and these spaces, in a general way, extend from about the middle of the distal phalangeal area to the metacarpophalangeal area. There is a fairly large closed space connected with the thumb and thenar eminence, which, practically speaking, extends from the middle of the terminal phalanx of the thumb down the palmar surface of the thumb, over a good part of the thenar eminence, and terminates in the region of the anterior carpal canal. Similarly, on the little finger side of the hand, the largest closed space is found, and this extends from nearly the tip of the little finger down to the anterior carpal region. Most often these two last-named spaces are separate, but, at times under normal conditions, one space may communicate with the other. Very often infections in the thumb result in a spreading of infection to the closed space on the ulnar side of the hand. Exten-

drainage of a lumbrical abscess so placed that they do not injure digital vessels and nerves. A word might be said on the elevation of a V-shaped flap on the palmar surface of the hand, with excision of a small portion of the deep palmar fascia, by which infections in the thenar and ulnar spaces may be drained. Excision of a small portion of deep palmar fascia tends to prevent contractures in the deep palmar fascia, which cause restriction of motion. Before demonstrating the splints used after drainage of infection has been established, one rule must be briefly mentioned in connection with incisions for drainage purposes, and that is, incisions must be made through a bloodless field. In other words, a tourniquet of some kind must be used, and anesthesia is best obtained by any method other than introduction of a fluid with the use of a needle. A piece of rubber tubing for a tourniquet should be replaced by the ordinary blood pressure cuff. This precaution tends to prevent the occurrence of tourniquet paralysis, and the use of a general anesthetic, unless con-

traindicated, is much safer than local infiltration anesthesia.

These splints designed within the past year will now be briefly described.

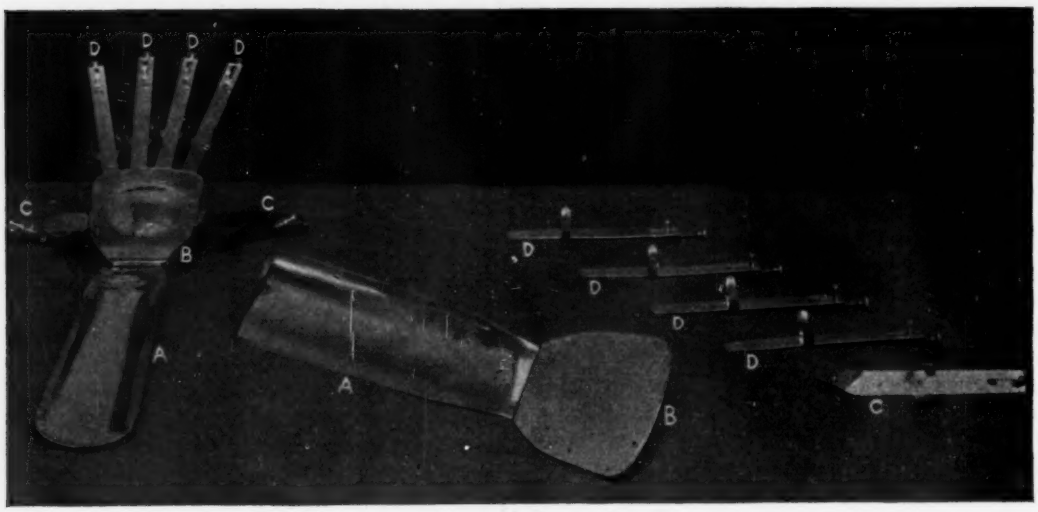
No. 1: The basis of all of these splints is this simple cock-up splint on which the metacarpal area, wrist, and forearm may be rested.



SPLINT NO. 2.

Same as Splint No. 1 with platform for fingers and thumb attachment.

A. Forearm attachment.
B. Metacarpal platform.
C. Detachable piece for resting fingers.
D. Detachable thumb piece.



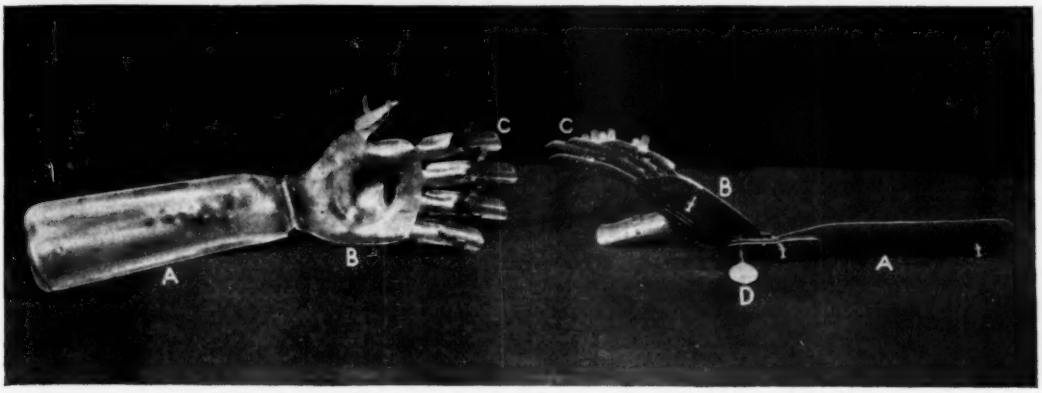
SPLINT NO. 3.

Extension splint assembled, and removable parts detached.

A. Forearm attachment.
B. Metacarpal portion.
C. Thumb attachments for use in either the right or left hand.
D. Finger attachments with little thumbscrews to produce extension; also, each finger and thumb attachment removed.

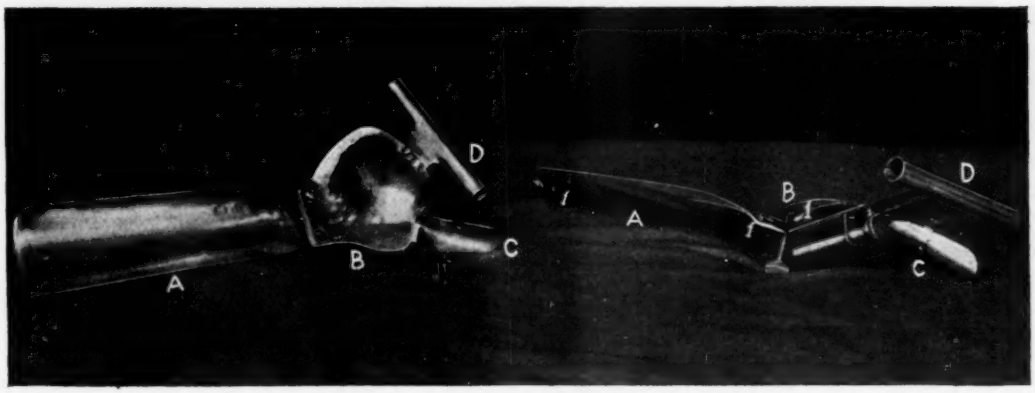
You will note that the use of this thumbscrew permits any cock-up angle desirable, and the patient, properly instructed, may increase or decrease the cock-up angle by the use of this thumbscrew.

No. 2: By simply adding a tongue to the splint already described, and an attachment on which the thumb may be held comfortably at rest, this splint is made. It is an excellent splint used in the treatment of generalized infections of the hand, where the fingers become markedly swollen, and particularly where disturbances in lymphatic drainage occur. With the aid of this splint, as the hand progresses, this tongue may be removed; the thumb attachment also removed; the metacarpal area may be held in desirable cock-up position, and exercise of the fingers and thumb carried out. Exercises, carefully carried out, are most important in the aftercare of all infections of the hand. You will note with the use of this splint that motions in the metacarpophalangeal joints are permissible, while the palm of the hand, wrist, and forearm are held at rest.



SPLINT NO. 4.

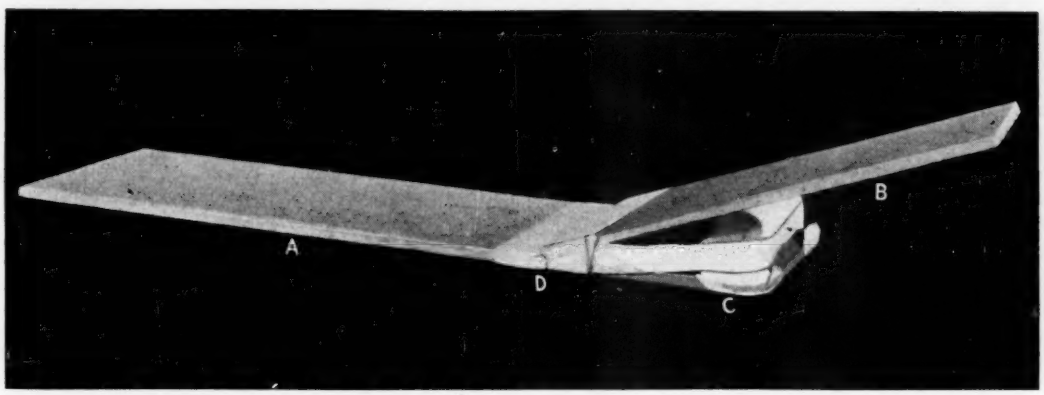
A. Forearm attachment.
B. Metacarpal portion.
C. Finger attachments.
D. Thumbscrew for obtaining any desirable degree of cock-up position. This splint is of value after plastic work or reconstruction work.



SPLINT NO. 5.

Splint used for producing extension of contracted fingers when there is no real ankylosis.

A. Forearm attachment.
B. Metacarpal portion.
C. Thumb attachment.
D. Attachment for extension of fingers, which patient easily adjusts and controls, by use of thumbscrew.



SPLINT NO. 6.

A. Ordinary piece of splintwood for forearm.
B. Piece of splintwood held to the main portion, at "D", with a piece of adhesive plaster.
C. Ordinary roller bandage between these two pieces of splintwood; placing the bandage back toward the angle increases the cock-up, and away from the angle, decreases the cock-up position. Any desirable degree of cock-up position may be obtained with this bandage.

No. 3: Infection at joint surfaces causes much pain. Separation of infected joint surfaces is desirable, first, to prevent and control pain, and secondly, as a prophylactic measure against varying degrees of ankylosis. Small pieces of elastic material held to the lateral aspects of the terminal phalangeal areas of the fingers, or, when not used for longer than seventy-two hours, sutures introduced through the bulb of the finger may be fastened to this little pin, which, in turn, is attached to a movable device. A simple thumbscrew on this device very easily permits extension of a finger, by which joint surfaces are separated, and extension is obtainable. Care must be taken not to injure the tip of the terminal phalanx, in inserting a suture for extension purposes.

No. 4: After infection has subsided, and when perhaps plastic procedures are necessary to restore usefulness in the hand, as far as possible, splints are most necessary after such operative measures have been carefully carried out. You will note that this splint consists of the first splint described, namely, a part for the metacarpal area, wrist, and forearm, and to this is added a special attachment for each finger. With the use of a thumbscrew, varying degrees of cock-up position may be obtained. You will also note that each of these finger attachments is removable.

No. 5: If a hand has been treated for a relatively serious infection and no splint has been used, and if flexion deformities have resulted in contractures of fingers, without ankylosis, this splint is of very great value in obtaining extension of flexed structures, without doing harm. To extend a partially stiffened finger forcefully will not infrequently result in that finger being less useful than before manipulation was attempted. It is not difficult to give a patient an anesthetic and straighten out a stiff finger held in a position of flexion. However, the finger might have been of some use in a position of partial flexion, but is of very little value if stiff and in a position of nearly complete extension.

No. 6: This simple cock-up splint, made with two pieces of splintwood, a bandage, a little adhesive plaster, and sheet wadding, is perhaps of more value than any of the splints described thus far, because with a little strap added for abduction of the thumb it accomplishes what is desirable in the cock-up position. It is inexpensive and may be made by any physician in five minutes.

I am very grateful for ideas which the Medical Adviser of the Industrial Accident Board, Francis D. Donoghue, has given me in this work on infections of the hand. I am grateful to many house officers for their assistance, to Mr. William H. Kraus, who carried out my ideas in the making of these splints, and for the help obtained from papers written by the gentleman who will say a few words about them, namely, Dr. Torr W. Harmer.

DISCUSSION

CHAIRMAN HAYDEN: I would like to call to your attention the fact that Dr. Browne has a booth in the scientific exhibit where these various splints can be inspected more closely.

The discussion will be opened by Dr. Torr W. Harmer of Boston.

DR. TORR W. HARMER, Boston: *Members of the Massachusetts Medical Society*—I wish to congratulate Dr. Browne upon the thought that he has devoted to the preparation of these splints and upon their mechanical ingenuity. As many of you know, I have been a pioneer in opposing the use of splints in many phases of hand surgery, believing that their use favored the formation of anchoring tendon adhesions and stiffened joints. The best measures to combat such consequences, I believe, are accurate diagnosis, minimization of operative trauma and early active motions. When I examined these splints with Dr. Browne at his office I was impressed with them and since then I have sought to determine their applicability in hand infections. They do not seem to have a place in such localized infections as paronychia, felon, boil and carbuncle. Of the other commoner hand infections there remain punctured wounds, as of needles, with lymphangitis; fascial space infections, such as those involving the midpalmar, thenar and lumbrical spaces; and tendon sheath and radial and ulnar bursal infections. In any of these types with lymphangitis, massive fomentations are indicated. The initially infected area is covered with a light dressing, the rest of the hand, forearm and, perhaps, upper arm are coated with boracic acid ointment or vaseline and a massive fomentation, consisting of part of a blanket, large rubber sheet and Turkish towel, is applied. This serves as an adequate splint.

Dr. Browne's splints are, therefore, applicable to the treatment of late or neglected cases of hand infections in which the wrist or phalangeal joints have become involved. In certain cases of wrist involvement it is desirable to ankylose the wrist in a position of optimum function, that is, in partial extension. The first splint that Dr. Browne showed does this admirably. In cases in which the phalangeal joints and the contiguous phalanges are involved, it may be desirable to ankylose deliberately these joints in optimum position of function rather than resort to amputation. One of Dr. Browne's splints might be used to accomplish this end, although a simple curved metal splint that does not coincidently immobilize the wrist is satisfactory. In this way I have saved the fingers of several doctors.

In cases with partially stiffened fingers, wider range of motion during active exercise of the phalangeal joints may be accomplished by stabilizing the wrist or metacarpophalangeal joints. An intelligent patient may be instructed to support these joints while performing his finger exercises. In unintelligent individuals Dr. Browne's phalangeal roller splint would be useful. The splints are clever. I am attempting to bring out their applicability. This, it seems to me, is in late or neglected cases of hand infection, not in acute infections.

CHAIRMAN HAYDEN: The papers are limited to twenty minutes, formal discussion to five minutes and discussion from the floor to two minutes. An exception will be made, however, in the case of Dr. Mont Reid's paper. I think there will be plenty of opportunity for discussion from the floor. Last year we planned a program of eight papers, without

any discussion. This year it was decided to revert to the usual custom, and I hope there will be free discussion of each paper. We will take all the time that is needed, provided the discussions are short and to the point. This paper is now open for general discussion. Dr. Cotton, have you anything you care to say?

DR. COTTON, Boston: No.

CHAIRMAN HAYDEN: This is a very important subject, and I know there are many points which could be brought out. If there is no further discussion, I will ask Dr. Browne to close.

DR. BROWNE: The important thing about these splints, if there be anything important with reference to the use of them, is in the aftercare of the hand following infection. There is no indication for the use of these splints in many types of acute infection, such as subungual abscess or infection in the paronychium or eponychium, but, where infection results in the development of contractures, where the flexor tendons contract and where the flexors, which outnumber the extensors, tend to prevent extension in the fingers, then, I believe, splints such as these are of great help. The value of these splints is perhaps in preserving intact the physiologic activity of the intrinsic muscles of the hand. After any plastic procedure, of course, these splints are of value, because they hold the hand, at rest, in a desirable position during the process of repair

CHAIRMAN HAYDEN: We will go on to the second paper, which is to be given by Dr. R. Nelson Hatt, and is entitled "Diseases and Injuries of the Hip Joint."

DISEASES AND INJURIES OF THE HIP JOINT*

BY R. NELSON HATT, M.D.†

ALTHOUGH the incidence of lesions, in and about the hip joint, is not high when compared with many other morbid conditions that may afflict the human organism and, although the treatment of hip joint lesions has largely been assumed by those specializing in bone and joint surgery, I find, nevertheless, ample excuse in discussing the subject before this group because many pathologic hip joints result in untold misery or death and because medicine, in general, is concerned with all phases of human happiness or the processes which lead to its destruction. It was Oliver Wendell Holmes, I believe, who once remarked, "Life begins within the pelvis but often passes out through the hip joint."

It would require something more than twenty minutes to present comprehensively even a single topic of my subject, but I pray that a rather modest synopsis may be found useful, if not particularly erudite or educational.

Since pathologic conditions of the hip joint may begin with the cradle and end with the grave and since each decade of life presents some group of conditions more common to its particular period than to any other, the enumeration of these conditions may logically be arranged on the basis of ten-year periods, recognizing, of course, that overlaps may, and commonly do, occur. For example, tuberculosis, infections or mechanical imperfections arising in childhood may become quiescent for years and then reappear in later life.

In the first decade, three conditions are of major importance from the standpoint of incidence:

(1) Congenital dislocations.
(2) Tuberculosis.
(3) Coxa plana (Legg-Perthes—Calvé's Disease).

*Read at the Annual Meeting of the Massachusetts Medical Society before the Section of Surgery, Springfield, June 9, 1936.

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CONGENITAL DISLOCATIONS

In spite of a fairly low statistical incidence probably every new-born infant should be suspected of having dislocated hips and the suspicion should be either verified or disproved by proper examination. The examination is not exacting or time-consuming, nor is it one bit less illogical than the routine eye prophylaxis which the obstetrician accepts as part of his duty even though satisfied in a majority of instances that gonococcus infection does not exist. St. Luke 15:4—"What man of you, having an hundred sheep, if he lose one of them, doth not leave the ninety and nine in the wilderness, and go after that which is lost, until he find it?" The congenitally dislocated hip is indeed a lost sheep, for the deformity is not obvious until the child begins to walk and even then, far too often, the shepherd whom the mother consults fails to seek, but allays her fears with the assurance that the awkward gait or limp is an inherited trait from the father or some other ancestor.

Acknowledging that the percentage of failures in treatment is a disgrace to surgery, mighty efforts have been made in the past ten to fifteen years to improve technic, devise new methods or more efficient appliances; but while the rest of the world took this direction, Putti of Bologna concluded that *early diagnosis* and early treatment represented the only logical answer and today, in the locality served by the Rizzoli Institute, every new-born child is carefully examined and x-rayed if doubt exists. Dislocated hips are treated in the early months by a simple triangular pad which holds the thighs in wide abduction and the percentage of cures, reported here by Putti, now stands at 97 per cent, as compared with 50-70 per cent in other parts of the world. I have two slides showing a brother and sister, one treated at 3 years of age the other at 6 months. The difference in the anatomy of these two is obvious and the boy is practically certain to suffer from traumatic

arthritic changes in later life due to the poor mechanical adaptation between the femoral head and acetabulum, while the sister's outlook is normal. It is, therefore, my plea that every baby shall be given a careful examination of the hip joints just as routinely as it now receives eye prophylaxis. Briefly, the diagnostic points are (1) inequality of leg length, (2) asymmetry of the sulci of thighs and buttocks, (3) piston action or telescoping when the leg is forced up and down in the long axis of the thigh, (4) loss of normal fullness of the femoral head beneath the femoral artery, and (5) x-ray if doubt exists.

The manipulative or closed reduction is fairly successful up to about the fourth year, the percentage of successes varying in inverse proportion to the increment of age. Reduction should be gentle, following the teachings of Denucé, and the closed method abandoned for the open, regardless of age, whenever easy reduction is not possible. Open reduction, after six years of age, carries poor possibilities. Preliminary stretching by means of skeletal traction is helpful in many instances but, in the difficult case, circulatory disturbances in the epiphysis and subsequent aseptic necrosis occur with resultant stiffening of the joint. In the case of the unilateral dislocation, this is not so serious but two stiff hips are a catastrophe.

In the older cases, we have the choice of three operative procedures: (1) The shelf operation, originally described by Dickson, (2) fusion of the single hip and (3) the bifurcating osteotomy of Lorenz. The routine employment of any one of these measures cannot be recommended but each has its indication when pain and disability demand surgical aid.

The problem of the congenitally dislocated hip, like cancer, depends upon early recognition and early treatment for better results and, in both, the general practitioner of medicine, serving as diagnostician, accomplishes as much and is entitled to as great satisfaction as the specialist who has learned to reduce a hip or eradicate a circumscribed new growth.

TUBERCULOSIS

The etiology and pathology of this condition need no comment here. A considerable percentage (about 20 per cent) is of bovine type and this should be sufficient to interest us in the matter of a clean milk supply. The symptoms are usually insidious in their onset with limp, pain, usually referred to the region of the knee, with progressive deformity and disability. The x-ray early may show only diminution of lime salts and a slight fuzziness in the joint between the inferior portion of the head and acetabulum. Later, the joint space is narrowed and destruction is evident in varying degrees in the acetabulum and femoral epiphysis.

The von Pirquet or intracutaneous tuberculin tests are of significance in this age group, although not necessarily diagnostic.

Besides relieving suffering and deformity, early treatment with extension, followed by a protective splint or plaster, will materially shorten the destructive stage of the disease and arrive at the quiescent period when surgery will be most effective and satisfactory.

Although many will disagree with Hibbs and his followers that the cure of a tuberculous joint occurs only with solid fusion of the articulation, no one has, to my knowledge, ever answered his challenge to "produce a case, biologically or histologically proved tuberculosis, which retained a useful degree of motion in a weight-bearing joint and which could be classified as permanently cured." Rollier of Leysin is the foremost challenger but would have his claims accepted without proofs. In my opinion, fusion or arthrodesis of the tuberculous hip joint by means of an extra-articular bone graft, represents the foremost advance in the control of hip disease known at the present day. Of course, no one will exclude the general medical aspects of tuberculosis and consider it a focalized disease reserved for orthopedic surgeons only, but will, rather, treat the situation as a systemic disease demanding local surgery.

COXA PLANA (Legg-Perthes—Calvé's disease)

This condition of unknown etiology closely simulates tuberculosis in its onset but the characteristic changes in the femoral epiphysis as seen by x-ray and a negative tuberculin reaction soon make differentiation easy. Typically, it occurs between the fourth and tenth years, rarely earlier or later.

Acute symptoms call for protective measures, but the condition is self-limited and poor end-results are not common. Legg, the first to recognize and differentiate it and tuberculosis, concluded that prolonged fixation alters the course but little.

Three other conditions of this decade are to be mentioned in passing:

(1) *Congenital coxa vara*, sometimes described as a congenital fracture of the femoral neck, is caused by a defect of the metaphysis, the epiphyseal plate being distorted with consequent shortening of the neck and loss of the normal angle. Clinically, it may be confused with dislocation. Corrective osteotomy affords good functional results.

(2) *Destructive epiphysitis* in infancy with loss of the femoral head. These infections are usually metastatic from an infected umbilicus, occasionally luetic and always accompanied by swelling and abscess formation. In my clinic, only end-results are seen—loss of the head

and neck, the gait resembling congenital dislocation.

(3) *Transient epiphysitis* (Miller). This is probably due to a pyogenic embolus of attenuated virulence or conversely a virulent one met by an efficient defense mechanism. In either event, as the name implies, a transient disturbance in the epiphysis or juxta-epiphyseal portion of the neck results, but quickly subsides with rest and general supportive measures. The onset may suggest tuberculosis but the skin tests are negative and the course is one of regression rather than progression and rarely results in permanent impairment. A few weeks of weight extension and attention to focal infection is sufficient in most cases.

SECOND DECADE

Associated with the adolescent period, and seen only exceptionally in others, is slipped epiphysis, coxa vara of adolescence or epiphysiolysis of the Bostonians.

As a rule, it occurs in the pituitary dysfunction individual of either the obese Fröhlich type or the rapidly growing, slender variety. Symptoms may begin with a vague ache in the hip, transient limp or sudden disability suggesting a fracture or dislocation. The trauma, however, is usually less severe than might reasonably be required for one of these major injuries. Pain, when present, is often referred to the knee. Flexion and extension may be free at the hip, but internal rotation and lateral motion are rather sharply limited. X-ray may show slight displacement at first but recurring attacks or progressive sliding may, in the extreme case, lead to a complete dislocation of the head or the neck, and to great disability. A variety of treatments are recommended, no one of which is universally applicable, open reduction being indicated in a few, manipulation with impaction in others and weight extension alone will suffice in a few. Within the past year, I have been fixing these hips with two or three threaded stainless steel pins of the Telson type. The results have been uniformly satisfactory with full weight-bearing after six to eight weeks, but the series is too small and too recent for more than passing comment.

THIRD AND FOURTH DECADES

Arthritis, traumatic and infectious, is common to these decades. Growth has ceased, metabolic processes leveled off, but physical activities are in high gear. Now it is that defects in the joint, more or less masked or compensated earlier by rapidity of tissue growth, begin to manifest themselves.

The specific defects most commonly underlying painful hips in this period are those resulting from coxa plana, shallow acetabula or partial ankylosis from old tuberculosis or other infections. Bifurcation or arthrodesis for the single hip relieves pain and often restores the individual to a functional status compatible with economic independence.

The reaction to traumatas, which earlier would have caused only transient disability, now results in changes within or about the joint—so-called traumatic arthritis. With protection and rest the process tends to subside while continued weight-bearing or vigorous manipulative procedures are apt to prolong disability. Traumatic dislocation, both intra- and extrapelvic, are also most common within this age period.

Infectious arthritis, usually a systemic disease, may, on the other hand, localize in one or both hip joints and, if progressive, as it usually is, great impairment of motion or complete ankylosis is the end-result. With ankylosis of both hips, arthoplasty of one will afford great relief from the distressing handicap. It is, in my experience, unwise to mobilize both hips unless the condition is localized to these joints as sometimes occurs in gonococcus infections.

Iliopsoas bursitis is a condition which simulates hip disease and, as O'Connor of New Haven has suggested, we seldom see cases because the possibility is not in mind.

FIFTH TO SEVENTH DECADES

The two outstanding conditions in the period of senescence are the following: degenerative, hypertrophic or osteo-arthritis and fractures.

Malum coxae senilis expresses the hypertrophic joint which, beginning with occasional twinges of pain, often referred to the knee, goes on to marked limitation of motion, adduction and external rotation deformity, apparent shortening and pain often sufficient to make crutches necessary. Bony ankylosis never results spontaneously and may even be difficult to secure with a technically excellent arthrodesing operation. Manipulations, plaster fixation, weight traction or other conservative measures are palliative. Reduction of weight in the obese is extremely helpful since stress and strain increase discomfort. In the robust individual or occasionally in the poorer surgical risk, when the pain element makes life a burden, operative fusion or the Lorenz type of subtrochanteric osteotomy is indicated. The relief is most gratifying.

Paget's osteitis deformans is mentioned as an occasional cause of painful hip in this age group.

FRACTURES OF THE HIP

It would be quite presumptuous, if not altogether ridiculous, for me to attempt more than to epitomize the subject. There are few sur-

geons who will not agree that the problem of the fractured hip is difficult and that treatment by any method is a matter of considerable uncertainty. Analysis points to two factors which make up the problem (1) physiologic, the age incidence — senility enfeeblement and a poor or interrupted blood supply to the part and (2) anatomico-mechanical, the fracture site is not readily palpable or accessible to fluoroscopic visualization, and accurate reduction and effective immobilization are difficult to secure.

The one-time accepted classification of intra- and extracapsular fracture is protested on the basis that fractures through the neck are usually both intra- and extracapsular. Of the neck fractures, the subcapital carries the poorest prognosis, while the basal is apt to unite even with faulty reduction and fixation. The intertrochanteric also offers no difficulties except when widely separated and mistreated by the textbook surgeon who follows some particular authority on hip fractures, disregarding the fracture site.

We now feel certain that many past failures were the result of inaccurate reduction and with the present ability to check reduction in two planes, namely anteroposterior and superior-inferior or lateral views, one may not omit this important aspect of reduction with any less culpability than would be the case of using only a single view in shaft fractures. We need not discuss methods of reduction and fixation, but it is my personal opinion that Dr. Smith-Petersen has "hit the nail on the head". His work has been fundamental and, while some of us have followed reluctantly, my conviction of the value of nailing is now sufficiently strong that should my own seventy-odd year old mother sustain a hip fracture, the benefit of this procedure would not be withheld from her, providing, of course, a surgeon competent to perform the operation were available. The relief from pain, the ability to sit and move about and the morale, a tremendously important factor, make a rather striking contrast with the uncomfortable old person, submerged in a plaster cast which, however expertly applied, does not completely immobilize the fracture, to say nothing of the tedious months of waiting for a possible nonunion, all of which require stamina and fortitude.

I believe that not only the 50 per cent nonunions but the 20 per cent mortality of hip fractures will be lowered as the technic of so-called blind nailing becomes mastered by those who qualify in the treatment of such conditions.

In concluding, I confess that this attempt to cover a complete discussion of the hip joint from the cradle to the grave in twenty minutes is indeed but another evidence of our present mania for speed, but if, on the flight, we have glimpsed the baby with dislocated hips whose future may depend upon your adjudication or have noted the oldster with high-soled shoe, crutches or cane, painfully going about or even condemned to a wheel chair existence when surgery has something better to offer, then the trip has been worth while and we have arrived at a happy landing.

DISCUSSION

CHAIRMAN HAYDEN: The discussion will be opened by Dr. George W. Van Gorder of Boston.

DR. GEORGE W. VAN GORDER, Boston: Dr. Hatt is certainly to be congratulated on being able to condense so comprehensive a subject into a very brief paper of twenty minutes. He has done this clearly and concisely and in a very interesting manner.

I should like to mention four points in the way of discussion. First is the importance of determining at the time of the birth of a baby whether its hips are normal. Those of us who have anything to do with the study of congenital dislocation of the hip are impressed with the fact that the only solution of the problem is early diagnosis. I wish, therefore, to commend Dr. Hatt for strongly urging that, at the time of birth, the hips of children be examined routinely to see if they are normal. In so doing, the attending doctor may be able to avert this tragic condition and save the child from a cripple's life.

My second point of discussion has to deal with Legg-Perthes' disease and I will have to differ with Dr. Hatt's opinion that in the treatment of this condition weight-bearing is of little importance. Even though Dr. Arthur Legg makes the statement that weight-bearing had very little influence upon this condition so far as his end-results were concerned, I think the recent work of Danforth has almost proved without a doubt that better results are obtained by keeping the child off its feet. This does not mean restricting motion of the joint or immobilizing it, but does mean letting the child get up and about with a walking patten bottom splint which permits the full weight-bearing in a raised shoe on the unaffected leg, but no direct weight-bearing on the involved leg. The results of Danforth have been so striking that I and most of my orthopedic colleagues feel it is most important to restrict weight-bearing in these children, and in our treatment at the Massachusetts General Hospital we do not allow weight-bearing in these cases until the epiphyseal and pathologic changes show that this can be done without danger.

A third point I should like to make concerns slipped femoral epiphyses. In our clinic in Boston we have tried, in the past, three different ways of treating this condition. First, we tried closed reduction of the slipped epiphysis, followed by application of a plaster cast. We found that the results were not good, that the epiphysis could move even though the patient was in a plaster cast and that we could not always control its position. A second series of cases was then treated by open reduction, followed by the use of a plaster cast. This series of cases gave results that were better than those of the closed reductions, but were still far from satisfactory. A third group of patients was then treated by internal fixation of the epiphysis on the femoral neck by means of a Smith-Petersen nail. The results of this last method of treatment have been far superior to those previously obtained. So, at the present time, I feel that the best treatment is to

fix the epiphysis in its proper position with a Smith-Petersen nail or with pins, the points being that we want the epiphysis firmly secured to its normal adjacent surface on the femoral neck and that the injury produced at the epiphysiodiaphyseal junction by the nailing will cause it to ossify. In other words, the surest cure of this condition lies in obtaining early ossification of the epiphyseal line with the head and neck of the femur in their normal anatomic position.

My fourth consideration has to do with the malum coxae senilis. Until recently, very little had been done to relieve this condition. A year and a half ago, however, a new treatment was advocated by Smith-Petersen which promises to be exceptionally hopeful. Those of you who recognize this disease and know its symptoms realize that the two main difficulties connected with it are limitation of hip motion and pain. Smith-Petersen has devised an operation called "acetabuloplasty" to relieve these two outstanding symptoms. Motion of the joint is improved by removing a portion of the interior acetabular wall, and pain is diminished or eliminated by excision of the anterior capsule of the hip joint. In the cases that have been operated upon, which now number over fifteen, practically all have received relief from pain and improved hip motion. I mention this new treatment of malum coxae senilis, even though it is in the experimental stage, because it seems to offer such great hope. Smith-Petersen's original paper on the subject was given before the American Academy of Orthopedic Surgeons in January of this year, is now in press and will be published very soon.

I have not time to go into the matter of fractures of the neck of the femur, but I am in accord with the ideas of Dr. Hatt that the nailing operation is the treatment of choice. I say this because, up to the present time, our percentage of excellent results with solid bony union, obtained by nailing, is 70 per cent and I know of no other method that will give equally good results.

CHAIRMAN HAYDEN: The paper is now open to discussion from the floor, and I hope we will have a more free discussion. Anyone desiring to discuss it will kindly state his name and come forward.

DR. FREDERIC J. COTTON, Boston: There are only two things I want to speak of. In the first place, with relation to Danforth's work, a very pretty piece of work, very distinctly conclusive, I want to throw perhaps a little different light on it. Danforth has produced amazingly good results, but he has done it at what seems to me to be an almost prohibitive price. It makes a great deal of difference to a growing child whether he is allowed to go about his work and play in a normal fashion, with occasional interference with splint support, or whether that child is doomed to be crippled for a number of years, thereby getting a little better hip. I agree with Legg. I think the price is too heavy to pay.

With relation to the slipped epiphyses, I have been greatly interested in these cases. I feel that the operative results of a few years ago were pretty poor. I have not had difficulty in maintaining reduction. The question, which is an open one, is how long it has to be kept up. It seems to me that some form of nailing may be desirable. I am glad Van Gorder brought out the facts so clearly on consolidation of the hip with the neck. No one has spoken of the new work done by Bozan. I rather think he has the rest of us beaten. I saw his work in New York, and I think it is probably the thing we want to do because he has apparently shown that we can increase the rate of consolidation by drilling. But do not forget that these cases will consolidate without anything being done except reduction and that they will consolidate in an amazingly short time. I have three cases, all of which have consolidated, and the whole thing has happened since reduction was done the first of the year. That is rapid, perhaps, but we may increase that rapidity by Bozan's drilling. I think that, with Legg's nonoperative reduction and the type of nailing Dr. Hatt spoke about, you will obtain a much better result than you will from any form of open operation.

CHAIRMAN HAYDEN: I will ask Dr. Hatt to close the discussion.

DR. HATT: I have nothing further to add only I wish to thank Dr. Van Gorder very kindly for the excellent discussion of what I attempted to do.

CHAIRMAN HAYDEN: It becomes necessary at the close of the meeting to elect officers of the Section for next year. I would like to appoint a Nominating Committee at this time and ask the committee, before the close of the meeting, to present their recommendations.

(Nominating Committee, consisting of Dr. P. E. Truesdale of Fall River, Dr. Peer P. Johnson of Beverly and Dr. Garry deN. Hough of Springfield, was appointed.)

The next paper is one to which we are all looking forward with a great deal of pleasure—"Some Considerations of the Problems of Wound Healing" by Dr. Mont R. Reid of Cincinnati. Dr. Reid has a reputation for being an especially meticulous and painstaking surgeon. I remember one occasion on which he traveled to Boston and did an extremely fine piece of vascular surgery, the accounts of which sounded most fascinating. Dr. Hopkins and I were in Cincinnati some months ago and persuaded him to come and address this meeting. It is with real pleasure that I present to you Dr. Mont R. Reid.

SOME CONSIDERATIONS OF THE PROBLEMS OF WOUND HEALING*

BY MONT R. REID, M.D.†

"THE subject of this evening's lecture is irritation" (wound healing), "which, being the foundation of surgical science, you must carefully study, and clearly understand, before you can expect to know the principles of your profession, or be qualified to practice it creditably to yourselves, or with advantage to those who may place themselves under your care." Astley Cooper.

"The proper treatment of wounds is to be

*From the Department of Surgery of the College of Medicine of the University of Cincinnati, and the Cincinnati General Hospital.
Read at the meeting of the Southwestern Virginia Medical Society, Galax, Virginia, April 2, 1936.
Read at the Annual Meeting of the Massachusetts Medical Society, Section of Surgery, Springfield, Massachusetts, June 9, 1936.

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regarded as the most important requirement for the surgeon." Billroth.

I offer these two quotations in lieu of any apology for the subject of this occasion's address. Should there need be any other I should only make mention of the prevalent feeling that wound healing is a subject to be mastered by the student in a course of pathology and later to serve as a filler in the first part of modern textbooks of surgery. At the outset I would make a plea for discarding this perfunctory attitude toward our problem and for re-establishing, as of old, the idea that a thorough knowledge of the principles of wound healing and its daily, thoughtful application is of the most fundamental importance in the practice of surgery. The importance of our subject is in no manner dimmed by the fact that anesthesia and modern methods of controlling hemorrhage have immeasurably widened and multiplied a thousand-fold the incidence of wounds. Nor is there any justification for the attitude that the discovery of bacteria and the subsequent development of countless aseptic and antiseptic procedures have to the slightest degree lessened the necessity of understanding the fundamental principles of wound healing. To me the reverse attitude seems to be the obvious one.

Wound healing is wound healing under whatever circumstances it may occur and the reparative processes are essentially the same, except in degree, regardless of whether the wound heals by first, second, third or any other intention; and whether it be considered infected or clean. Nobody could deny the importance of the presence or absence of bacteria in wounds but I hold it to be equally true that, in the problem of wound healing, their presence in a wound should be regarded as an incident or complication which cannot be intelligently evaluated or treated without a thorough knowledge of the process of wound healing and of what living tissue itself, in this process, can do with such a complication. Viewed in this light it is questionable if bacteria assume a role of greater importance in wound healing than do necrosis, débris and devitalized tissue, or granulation tissue, or fibrin or other factors which must be taken into consideration. Some day we may yet find Paré worshipped by the surgeons on an equal basis with Pasteur.

Throughout our surgical literature we read that the brilliant progress of surgery has been due to anesthesia, the control of hemorrhage and the control of infection. At the risk of the accusation of heresy and ingratitude I would suggest that we change "the control of infection" to read "a knowledge of wound healing" which, naturally embracing a consideration of infection, will, I believe, lead to a more intelligent practice of our art as well as to a greater perfection of it.

Wound healing is a daily problem in the life of nearly every doctor. Yet it would be interesting to know how few wounds are treated on the basis of study and thought to determine what form of treatment they need. My own experience with students, interns and doctors in the management of wounds is constantly disappointing. They seem always to be asking for a routine of therapy which, it is clear to me, should be evidently impossible of adoption by anyone who understands even the merest fundamentals of the processes of wound healing. For instance, I am repeatedly asked when skin sutures should be removed and my answer is when the wound is sufficiently healed. Or, how should open wounds be treated and my reply is to look at them and study them and then do what you think the wound demands. For a long time it has seemed to me that routines of wound treatment and thoughtlessness or ignorance of wound healing go hand in hand. And this statement is just as true in the management of deliberately planned wounds as it is in the case of traumatic, ulcerated and infected wounds.

To discuss any of the problems of wound healing in this paper it is, of course, necessary to assume that the reader has a knowledge of the well-established principles or processes of wound healing. Among these must be mentioned the prevention or elimination of necrotic tissue and débris in wounds. Paré's original observations with respect to the importance of this consideration may well be compared with those of Lister in connection with the use of the carbolic spray to prevent infection. Yet, only the most casual observation of operative technics reveals that the subsequent refinements of aseptic and antiseptic procedures have far surpassed those which should have followed the original observations of Paré. Pasteur's work told the world what was causing the infection of wounds and unloosed, beginning with Lister and his carbolic acid, a veritable flood of bactericidal agents which show no signs of abating even today. Paré astounded himself and the surgical profession of his time when he learned that the sloughing incident to the burning of wounds with boiling oil or the actual cautery had a very deleterious effect upon the healing of wounds. He learned that the gentlest cleansing of the wounds with the commonest innocuous substances at his disposal at that time, such as water and soap, gave the best wound healing. Today, with our knowledge of the delicacy of growing living cells and of their lethal susceptibility to alcohol, ether, iodine, mercurochrome, merthiolate, carbolic acid, bichloride of mercury, and countless other substances, people go blithely on pouring them into open, fresh wounds to kill living cells and to complicate the process of wound healing and

to promote the chances of infection. So far as fresh traumatic wounds are concerned we would today be far better off with a total ignorance of all chemical bactericidal agents and if we only utilized our knowledge of bacteria and of wound healing by gentle mechanical cleansing of the surrounding skin and open wound of all dirt, foreign bodies, dead or devitalized tissue and by flooding the invisible bacteria away by means of sterile salt solution. Paré, was, in the light of modern knowledge, densely ignorant but he acted with amazing sanity; today, with a colossal knowledge of the properties of both bacteria and living cells, many wounds are being treated with a lack of sound judgment. This fundamental principle of wound healing which Paré taught the surgical profession over four hundred years ago is constantly being disregarded. In order to worship at the shrine of Paré we must be rid of our bondage to advertising pharmaceutical concerns which delude our profession into the belief that the one essential aid to wound healing is the killing of germs with agents which they do not tell us are also killers of countless invisible delicate living cells. To date, you can accept it as a fact that all germicidal agents are also capable of killing growing cells or of damaging the medium in which they must grow.

Rest. For many centuries, and especially since the writing of Baron Larry upon this subject, rest of the wound has been recognized as one of the essential aids to wound healing. Let me quote from Billroth: "Hitherto I have not mentioned that the absolute rest of an injured part is always necessary; it may seem singular that I should mention it at all, you may think this should be considered a matter of course. I lay particular stress on it, because injurious substances are taken from the wound into the blood: hence every muscular movement, and every consequent congestion of the wound, in short, everything that drives the blood and lymph more strongly into the vicinity of the wound, may eventually prove injurious. Of late, I rarely see contused wounds do so well as compound fractures of the extremities, where plaster dressings are at once applied; hence we have a strong hint to compel absolute rest of an extremity with a large contused wound without fracture, by applying a fenestrated plaster-splint. The cases where I have done this did remarkably well; even after amputations of the hand and foot, where the patient was very restless, I have applied the plaster-splint with excellent result, and think this mode of treatment, which we shall describe more fully under compound fractures, may be more extensively used than hitherto." Complete recognition of a principle in the abstract is by no means followed by an intelligent application of it. There can be little doubt that for a generation or two there has been a great neglect in the use of this unquestioned aid to the healing of wounds. Of late there has been some re-emphasis of its value, especially by Orr, Koch and others, and the results have led to astonishment on the part of those who have recognized the manifest indications for the employment of the principle of rest in wound healing. And, perhaps, the spirits of Billroth and Baron Larry are rejoicing. In this instance, too, Homans is vindicated for writing that "In Surgery, however, as in every other art, fundamental matters are perennially being discovered, discredited, forgotten, rediscovered and reaffirmed."

Blood Supply. There is also no argument in principle that a third important factor in the healing of wounds is the blood supply. But I venture the belief that there is a great lack of consideration of this fundamental factor in the routine practice of surgery in this country. Men will readily agree that there are vast differences in the healing of wounds of the aged and the young individuals, of the debilitated and the robust persons, and yet make very little allowance for these differences in the planning of incisions, the tying of ligatures and sutures. The whole problem of the harm of tension within wounds is directly linked with this matter of blood supply to them. Its consideration will dictate to the thoughtful surgeon the position in which he wishes a wound to be kept in order to secure for it the maximum blood supply. To him the crippling effects of edema on blood supply may indicate the elevation of a wound in a healthy part while a sluggish, trickling arterial supply may make him choose for the wound a position somewhat below the level of the heart. Recently an arteriosclerotic patient insisted on sitting up all night because of the relief he got from an agonizing pain he was suffering in an ulcer of his great toe. He had been thus trying to sleep for months. By simply elevating the head of his bed four inches he slept comfortably all night and for him this was well worth a trip from a distant part of the country. A practical regard for blood supply will substantiate the spacing of skin sutures so that a moist dressing, kept moist by the overlying oil silk or gutta percha will relieve tension by permitting the oozing of serum and blood during the period of swelling or edema in the wound.

Time will not permit me to cite other obvious applications which, no doubt, occur to you in connection with a consideration of this universally accepted principle of the rôle of blood supply in the healing of wounds.

Hemostasis. A fourth generally accepted aid to the healing of wounds is ideal hemostasis. The qualifying word "ideal" is used deliberate-

ly instead of the more generally accepted term "complete". There is no question that a hematoma of a wound interferes by tension with blood supply, prolongs wound healing, injects the presence of a large foreign body, and immeasurably encourages the development of the clinical signs and symptoms of infection and suppuration. Yet the excessive devitalization of living tissue by unnecessary ligatures of small blood vessels and too many tight sutures also interferes with blood supply, prolongs wound healing and invites infection (fig. 1). Thus, in a measure, the utilization of the principle of hemostasis in wound healing may run counter to Ambroise Paré's principle of the value of eliminating from wounds all necrosis. In the World War, experiences with the secondary closure of wounds taught us a great deal about the rôle that ligatures and buried sutures may play in the healing of wounds. The greatest successes resulted whenever it was not necessary to bury any ligatures or sutures. Plastic surgeons have perhaps the keenest appreciation of this great principle of surgery. They will spend literally hours in controlling bleeding by means of gentle pressure and warm saline compresses when surgeons less appreciative of the value of Paré's contribution would hastily resort to ligatures. They know that devitalized tissues and infections are the greatest wreckers of the success of their work. The same principles are equally applicable to all forms of surgery. This fourth principle in the healing of wounds, namely, hemostasis, injects forcibly, for the first time in this paper, the necessity for the great element of judgment if one would attempt to weigh and evaluate in the practice of surgery the contradictions inherent in the application of the fundamental principles of wound healing. Reared in a school of complete hemostasis, and cherishing this principle perhaps above all others, I would nevertheless like to acknowledge the debt of an apology to both Paré and Larry. A due regard for the harmful effects of necrotic tissue and the beneficial hemostatic effects of complete rest of a wound would probably have saved me the necessity of tying countless numbers of knots.

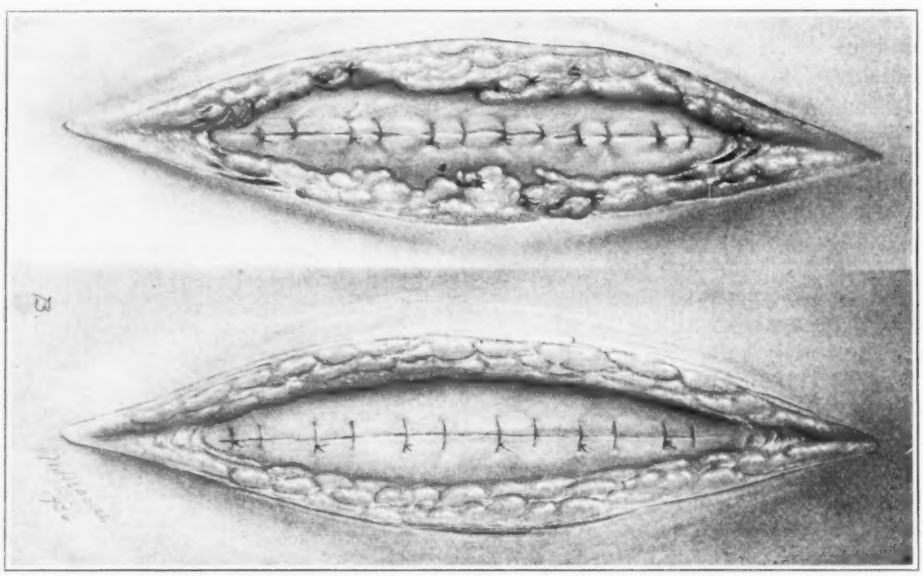

FIG. 1. The improper and proper methods of closing a wound. With an equal amount of contamination wound A., which has been traumatized and the sutures tied too tightly, runs a much greater chance of suppuration than does wound B., in which the tissues have been properly approximated and no devitalized tissue left in the wound.

Infection. A fifth great consideration in the healing of wounds is the prevention and treatment of infected wounds. Nobody can deny that efforts along this line should and do take the rank of first importance in the problems of wound healing. Modern surgery owes its very life to our knowledge of bacteria and the methods and means of preventing and treating their complications to the problem of wound healing. But are we not in the lethargy of perfect satisfaction with an unprecedented and almost miraculous spurt in our art of surgery which is yet far from its goal? Are we not in the doldrums of further progress by our slavery-like submission to the dictates of the manufacturers of germicides? Surely the use of every one with which I am familiar involves some sacrifice of other fundamental principles of wound healing. Is there no way of determining the price to be paid for their use and of deciding whether it is too great to be justified? In the matter of asepsis of the skin perhaps a recent reply to a salesman of a patented antiseptic solution may be permissible. He asked me what

germicide I used for the skin and I said that I did not care so long as the skin was first made macroscopically clean by the use of soap and water, alcohol, and ether and the germicide was free of germs and would not burn the skin. Except for the sin of using skin antiseptics in lieu of careful mechanical cleansing of the skin of all dirt, the modern preparation of the skin seems not often to violate the other fundamental principles of wound healing. When, however, it comes to using bactericidal agents in open fresh wounds one is confronted with the fact that if they are capable of killing micro-organisms they are also capable of killing or damaging the delicate living cells which in turn become excellent food for the growth of germs.

In general it may be stated that the conditions which are ideal for the destruction of bacteria are in no sense ideal for the growth of living cells. Likewise, some of the conditions which are ideal for the growth of living cells may be very conducive to the growth of bacteria. The very medium in which living cells must grow is usually quite attractive food for bacteria. And both bacteria and cells have about the same optimum temperature for reproduction. Thus it frequently happens that one's efforts to promote the healing of wounds may help the growth of bacteria and the reverse is also true. In the course of the healing of an infected granulating wound it is usually desirable to be switching back and forth from tissue reproducing measures to bactericidal treatment in order to get the best result. When the wound is relatively sterile the adoption of a policy of rest, optimum temperature and noninterference may result in a rapid healing, until the multiplication of organisms becomes so numerous that the plasma or medium for the growth of cells is all devoured by them. Then healing comes to a halt and attempts at further sterilization are in order.

"The sterilization of freshly made wounds is, like the sterilization of the skin, a relative and not an absolute matter." (Homans.) Thus logically as well as practically the use of tissue damaging chemicals in an attempt at sterilization of fresh wounds is not often justified, for the resultant necrosis encourages too much the growth of the organisms not killed. Débridement of dead or devitalized tissue and of foreign materials plus a careful flooding away of the bacteria with sterile water or normal salt solution will usually leave the tissues in such a healthy state that they can cope with the few organisms present without exhibiting the evidences of clinical infection (fig. 2). The harm which has resulted from pouring strong antiseptics into open wounds cannot possibly be estimated. It is impossible to estimate the harm and suffering which have come from the use of iodine for this purpose. For the less powerful antiseptics an appeased conscience which has led to the ignoring of some of the fundamental principles of simple cleansing has often compensated for the lessened damage to the living cells. To quote again from Billroth: "For the first treatment of the part poisoned by cadaveric matter, I advise you to let cold water run on the wound for a long time, and not check the bleeding, if there be any. In many cases the injurious matter will be washed out, and there will be no further infection. Cauterization immediately after contact with the poison, from a considerable experience on myself and on my students in the course of operations, I consider unadvisable." It may be argued that he did not have at his disposal the modernly refined antiseptics and this may be met by saying that he was not aware of the delicacy of living cells

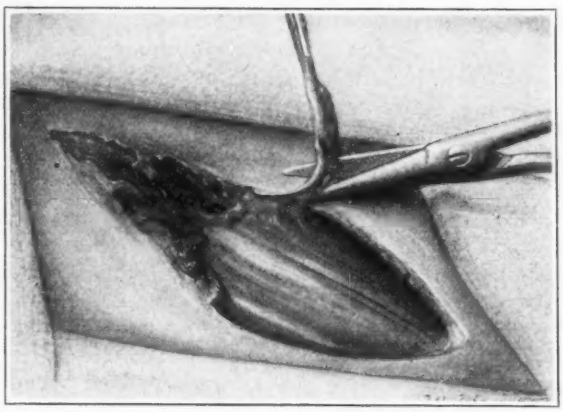

FIG. 2. Débridement of a fresh traumatic wound. Note how the devitalized tissue is being removed by sharp dissection.

or of the power of them to destroy bacteria. He was not even familiar with the rôle of bacteria in wounds and yet he made true observations which are constantly being ignored today.

Not long ago a friend of mine brought his boy hurriedly to my home because of a laceration of the end of his thumb. If the boy had not held his wound under running water the father would not have been so worried; he would have put some iodine on it and wrapped it up. As it was he was very afraid of an infection from the water. You can imagine his surprise when, after cleansing the skin about the wound with benzine and then cutting away some dead fragments of skin, I gave the boy a stool by the sink and told him to run warm water on the wound while the father and I discussed fishing. After the lapse of ten or fifteen minutes a large amount of vaseline was placed on the wound and secured in place by a soft dressing incorporating a splint to immobilize the thumb. The hand was placed in a sling and the father was instructed not to bring him for an inspection of the wound for a week unless he should show an elevation of temperature or complain of pain. No antiseptics were used in the open wound. There was practically no pain and no

fever. At the end of a week the wound was healed. The father, like thousands of other people of our generation, had been imbued since birth with the necessity of using iodine or some antiseptic to kill the germs in such a wound. He had never seen a wound like that heal without getting red and painful. He didn't know why I had used a splint or why the hand was put in a sling or why the fragments of dead tissue were cut away. To him the one essential on such an occasions had always been to kill the germs at whatever cost in pain, suffering and infection. He could only shake his head and say, "I do not understand."

This father's attitude reflects, I believe, the viewpoint of the average layman today with regard to the handling of trivial wounds and probably that of the vast majority of the doctors of our time with respect to all wounds.

I have dwelt at some length upon this fifth consideration in the healing of wounds because it is my belief that the modern antisepsis of fresh wounds does not justify the wholesale violation of some of the other fundamental principles of wound healing, notably those dealing with the harmful effects of necrosis and débris and the beneficial effects of rest. In this whole important business of the control of infection in fresh wounds, there is a crying need for a sane modification of our viewpoint so as to make it fit more harmoniously with other established principles of wound healing rather than permit it to usurp them.

Granulation Tissue. An understanding of the problems of wound healing presupposes an appreciation of the importance of granulation tissue. Its formation is essential to the healing of every wound. Besides, in the absence of an epithelial or endothelial protection, it becomes the body's best defense against invasion of bacteria. Nearly seventy-five years ago Billroth reported the following experiments to his students:

"If you inject a drachm of putrid fluid into the subcutaneous cellular tissues of a dog, the result will be inflammation, fever and septicemia. If you make a large granulating surface on a dog, and dress it daily with charpie soaked in putrid fluid, it will have no decided effect. On the borders of the inflammatory new formation the lymphatic vessels are closed; on the granulating surface there are no open lymphatic vessels, hence no reabsorption takes place." Hence, the protection of granulation tissue from traumatization and insults of any nature becomes of paramount importance in the consideration of wound healing. On its exposed surface there are always bacteria and I am sure that those of you who have had any considerable experience with wounds can recall fatal cases of septicemia resulting from the making of granulation tissue bleed as well as numerous examples of local exacerbation of the infection. Its appearance usually reflects accurately the severity of the surface infection, as well as the adequacy of its blood supply. In the absence of surface infection, granulation tissue always assumes its healthiest possible appearance. Juicy, pale and swollen granulations probably represent their best efforts to combat infection. The obvious indication is to help rid them of the infection and not to rid the body of their protection. Once relatively free of infection whether by their own efforts or with the aid of Dakin's solution, some other mild germicide or moist pressure dressings, they will spontaneously return to what is regarded as their normal, red, granular appearance. It seems to me that it is fair to assume that granulations are always doing the best they can under any given circumstances and that there is no justification for speaking of healthy and unhealthy granulation tissue. It would appear that they are most pleased when least disturbed.

Tissue Growth. While I have made hasty mention of the five or six factors which most surgeons agree are of fundamental importance in understanding the behavior of wounds and in the intelligent treatment of them, I believe that the more modern work of Carrel, Lewis and many others with tissue culture, justifies the addition of another important factor which should be necessary and helpful, namely, some understanding of the actual process involved in the growth of living cells in a wound. For, after all, it is the multiplication and growth of cells which cause the healing of a wound, save for what is accomplished by the process of contraction.

In a large sense nearly all of the principles of wound healing which I have been discussing have a rationale in the beneficial effect they have on the growth of living cells. Dead or devitalized tissue diverts the energies of growing cells from the problem of repair to one of elimination of foreign materials. Rest of wounds promotes the growth of living cells just as it does in the case of the medium for tissue growth in vitro. Nourishment for the growth of cells comes from the blood stream and hence the more perfect the blood supply, the more ideal will be the medium in which the cells must grow. In addition to the poisonous effects of their toxins upon the living cells and body mechanism as a whole, bacteria also devour the medium for the growth of cells in wounds just as they do the medium for the growth of cells in vitro. Hemorrhage, as well as the surgeon's necrosis, gives to the cells the burden of removing additional foreign bodies. A casual observation of the behavior of superficial wounds in the winter and summer, illustrates the effect of temperature upon the growth of cells in wounds

just as its effect is well known upon the growth of cells in vitro.

If you will imagine a straight clean wound accurately approximated, the medium for the growth of cells which repair that wound will lie in a small crevice between the cut edges (fig. 3A). If you will then imagine that wound spread open like the leaves of a book, the medium will lie on a surface with one side exposed instead of being compressed into a thin line between two opposing surfaces of living tissue (fig. 3B). In either instance the process

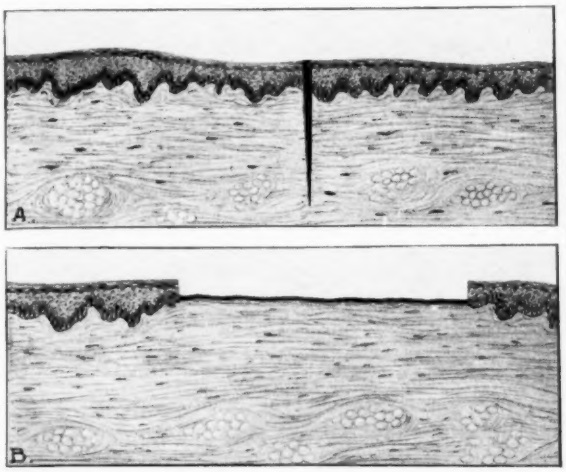

FIG. 3. Schematic illustration of a closed fresh wound and an open wound. In either instance the healing processes are essentially the same. The fibrin serves as the medium into which granulation tissue and epithelium must grow.

of repair is essentially the same except in the amount of the growth of epithelium. In both instances this medium is absolutely essential to the growth and multiplication of cells. The epithelial cells do not push themselves out over the surface, nor do the elements of tissue which form granulation tissue divide and jut out into space. They grow into and devour this coagulum of fibrin which is constantly forming on raw surfaces and granulation tissue. If, as we have repeatedly shown, a fresh wound is so energetically dakinized that no fibrin or media can accumulate, then there will be no formation of granulation tissue or growth of epithelium (fig. 4). When possible, nature's ideal way of preserving this medium for the growth of living cells is the formation of a sterile scab. To her I suspect that this means healing by first intention regardless of whether the edges of wounds are closely approximated or widely separated. Infection, traumatization, dressings which pull it away, interference with the blood which supplies it, and the unwise use of chemicals and bactericidal agents which may destroy it are the principal handicaps to the preservation of this medium. In the experiment just cited, if the wound be covered with vaselinized gauze and left undisturbed for twenty-four hours the base will become covered with healthy granulations and there will be obvious growth of epithelium. Perhaps in a few days, infection may likewise destroy the medium and halt the processes of healing. Striking an optimum balance, in such a wound, between methods to promote the growth of tissue and those to help control the infection can be no haphazard routine. It must be based on careful observation.

Would it not be well to regard every wound as a new growth in which, paradoxically, our every effort should be to promote its growth, knowing that some as yet not understood, biologic principle will terminate the process when healing is complete? With this conception constantly before us it seems to me that we would be more likely to evaluate properly our efforts to assist and, moreover, what is probably more important, develop an alertness to change them to meet the ever-changing demands of a healing wound.*

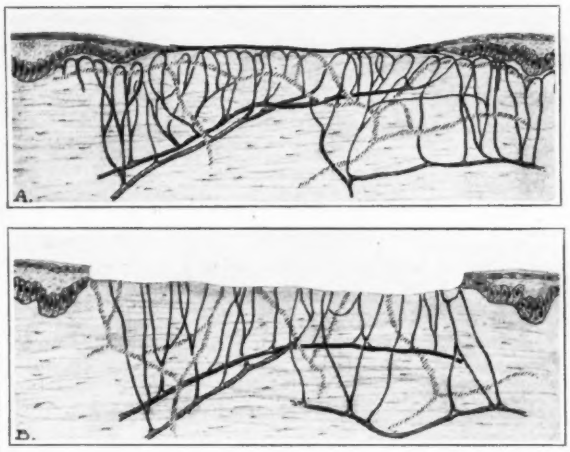

FIG. 4. A. A granulating wound. The vessels and the lymphatics are closed. When there is no traumatization there is no absorption, and the underlying tissues are best protected.
B. An open wound without fibrin showing the open vessels and lymphatics. Absorption takes place rapidly from such a surface.

With this general discussion of the fundamental principles which should be considered in the treatment of wounds it may be permissible for me to describe for you the attitude adopted in our clinic toward the treatment of certain types of wounds. This seems especially advisable since, as I have indicated, the utilization of some of these principles is often not compatible with the employment of others.

Surgical Wounds. In the minds of most people there are two types of wounds—clean, and contaminated or infected—, and the division between them is as sharp as between night and

*Throughout this discussion of wound healing I have deliberately omitted any mention of restoration of function of the wounded parts. From the pure standpoint of the principles of wound healing it does not merit serious consideration, but from the viewpoint of the results of healed wounds it may become a matter of some importance.

day. Little thought is given to the fact that every open wound, surgical or accidental, receives bacterial organisms and that the term *infection* is applied only in those instances in which the processes of wound healing exhibit obvious difficulties, in varying degrees, in combating this contamination. Little do we appreciate the natural protective forces inherent in wound healing. For every obvious difficulty with infection the processes of wound healing probably spare us the worry a hundred times by taking care of similar bacterial contaminations.

It is reasonable to assume that with the modern methods of sterilizing supplies and instruments, with the universal wearing of masks and gloves, and the effective preparation of the skin there is not a wide variation in the actual bacterial contamination of surgical wounds. In the vast majority of instances clinical infection is directly traceable to the burden of added insults heaped upon the tissues of the wound by the operator and his assistants. Viewed in this light there was never a truer statement than that of Homans in which he says that, "The patients' best defense against infection lies in the perfection of the operator's technique."

In the performance of identical operations and with presumably the same bacterial contamination, one surgeon may get an infected wound while the other will get primary healing. Some surgeons can excise a badly infected breast or close a severely contaminated laparotomy wound and virtually get healing by first intention while others will invariably get infected wounds.

The answer is in how well the soil has been prepared for the growth of the bacteria by the production of necrosis, traumatization of tissues and interference with blood supply. Definite efforts to avoid this invitation to the growth of bacteria are made in our clinic. Whenever possible blood vessels are tied before division and the end projecting beyond the ligature is removed. As few clamps as possible are used and whenever they are, a definite effort is made to grasp only the bleeding vessels. Vessels which in the judgment of the operator will not bleed upon removal of the clamps are not tied. When mass ligation is unavoidable, transfixion ligatures are employed and tied only tight enough to stop the bleeding and leave the included tissue viable. All obviously nonviable tissue, whether caused by ligatures, clamps or trauma, is excised if possible. Sharp dissection with the knife in the belief that it is less damaging to living tissue is the almost invariable rule. The use of clamps on the peritoneum and other tissues for purposes of traction demands an extraordinary excuse. The use of retractors and especially the self-retaining ones is reduced to a minimum. The placing of sutures in fat or muscle is almost never done because of the delicacy of these structures as well as the almost invariable uselessness of such sutures. Sutures are tied with extreme care lest their tightness or subsequent tightening due to edema will interfere with circulation (fig. 1). Some surgeons will tie with great force the sutures buried in the infinitely more delicate tissues and then close the skin loosely. If there is any justification for this I cannot understand it. Before closing a wound it should be free of bleeding, of air and of blood clots. In the case of local anesthetics the patient is made to cough or strain to see if any untied vessels will begin to bleed. Pressure with gauze for a few moments on the freshly cut surfaces of a wound may reduce by 50 to 75 per cent the number of clamps which otherwise might have been used. Finally the wound, when closed, should present tissues, as nearly as possible, as healthy in appearance as when the incision was first made. Drainage of clean wounds is never employed. In wounds where there is known to be serious bacterial contamination or considerable oozing of blood, deliberate provision is made for gaping, between the skin sutures. In the case of such abdominal wounds, no sutures are placed in the line of the incision but, instead, the wound is closed with through-and-through silver wire sutures placed far removed from the edges of the wound. Moist dressings are applied and kept moist for a considerable time by means of a rubber protective so that tension of the wound may be relieved by seepage during the period of edema or slight hemorrhage (fig. 5). The wound is placed in the position of optimum general circulation and completely immobilized when thought necessary and especially during the period of recovery from anesthesia. Unless indicated by pain or evidences of infection or hemorrhage, the wound is left undisturbed until it is thought it may be desirable to remove some of the stitches.

It is obvious that these are only a few of the safeguards against the development of infected wounds due to errors of operative technique. It is not necessary to mention any others, for, when an operating surgeon works with a mind acutely conscious of wound healing, he will unconsciously adopt all of them; if he does not, what I have already said becomes well-nigh useless and the patients will go on paying the price in pain, disablement and even death.

It must be added that in many, many instances the very efforts of a surgeon to prevent the infection of surgical wounds constitute the direct cause of the infection. His very

efforts at destruction of germs have made the living tissues incapable of coping with a contamination which otherwise they might have handled with ease.

Finally a good aid to the healing of surgical wounds is to make every unexpected infection or failure of an even hoped-for primary union a matter for serious investigation. This policy in any clinic is always beneficial to the problems of the healing of surgical wounds.

Traumatic Wounds. We are paying for the advancement of industry and for our economic development an enormous price in wounds, disability and lives. Nearly seventy-five years ago Billroth said, "You may imagine, not only how much sweat, but how much blood clings to the many evidences of modern culture". When one reads such a statement the usual reaction is a smile if one thinks of Billroth's remarks in comparison with the problems of our time. The differences in the magnitude of the problems of his time and of ours may be just cause for a smile, but there is serious doubt if genuine chagrin should not be the result if we should consider the progress which has been made in handling these problems. Viewed in this light the surgeons of today are face to face with a distinct challenge lest our efforts in the treatment of traumatic wounds be subject to censure by the surgeons of the not distant future.

To meet this challenge we have endeavored to develop in our clinic methods of treatment of traumatic wounds which we believe are based upon the accepted principles of wound healing of our time. Our application of these fundamental principles of wound healing in this very large field of surgery may, of course, be wrong but our conscience is free in that we may not be accused of acting without thought or under the influence of domination by the bactericidal therapeutists.

In the case of all traumatic wounds, bleeding of any consequence is first controlled preferably by elevation of the part and pressure or when absolutely necessary the clamping of individual vessels. The wound and surrounding skin are then flushed rather vigorously with a large quantity of sterile normal salt solution. The skin about the wound is shaved, washed with soap and water, alcohol, ether and possibly painted with some of the accepted skin antiseptics. None of the alcohol, ether or antiseptic is permitted to enter the fresh wound. Next sterile draping is done as though for a clean surgical operation. If any clamps were placed to control hemorrhage they are held up by an assistant during the washing and skin preparation and are now removed by him and replaced, when necessary, by fresh sterile clamps by the operator. If the operation is to be done under local anesthesia the skin infiltration is made well away from the edges of the wound. With this preparation the wound, and skin edges, are

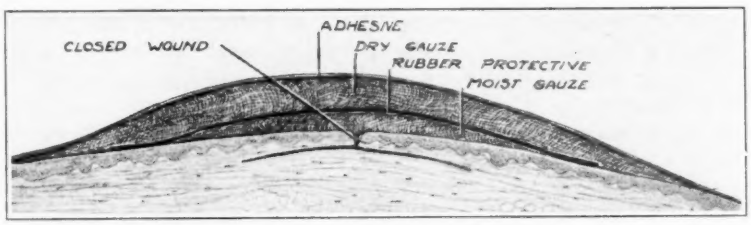

FIG. 5. A diagram showing the method of dressing fresh wounds which have been properly closed.

débrided by sharp dissection of all débris, dead, crushed, devitalized or dirt-stained tissues. Frequently it is necessary to use soap and water on the fresh wound in order to remove greasy dirt. The fewest possible ligatures are placed in the wound. After this another very careful and thorough irrigation of the wound with hydrogen peroxide followed by sterile normal salt solution, is done. The wound is then ready for surgical repair and dressing. Only when absolutely essential are buried sutures used. Skin sutures are tied loosely and widely spaced so that there will be free seepage from the wound into the moist dressing. Usually it is far better to use no skin sutures which may in any way imperil the blood supply to either side of the skin edges. An avulsed flap of skin is far more useful alive and unsutured than dead from the anemia of the tension of the sutures which place it beautifully back into perfect position. To tack a flap of skin loosely back one-half inch or more from the opposing edge is, I think, the hardest thing in the world for a young surgeon to do. About six months ago a young girl of fourteen years received in an automobile accident an extensive laceration and contusion of the left thigh. A large triangular flap of skin and muscle was turned upward from just above the knee. The transverse tear extended from the lateral side of the thigh across the top to the mesial aspect where it met a vertical laceration which extended upward for more than six inches. The muscles were torn and loosened up as far as the greater trochanter, exposing the bone from which a considerable area of periosteum had been removed. The tissues were

badly stained and there were many stones of varying sizes throughout the extent of the wound. After a painstaking irrigation and débridement such as described above, requiring more than an hour, the triangular flap of skin and subcutaneous tissue was gently laid back and sutured with three sutures which failed by one and a half inches to approximate the skin edges. A moist dressing was applied and the leg was encased in a large plaster spica which included the abdomen and foot. Although this patient was unconscious from a concussion of the brain and incontinent for three days during which the dressings became soaked with urine, the first dressing was not made for ten days. Healing was by first intention. The function of the leg is unimpaired even though much of the quadriceps and lateral leg muscles was cut away. No buried sutures were placed in the wound. It is amazing with how little scarring even large open wounds will heal if there has been little or no loss of skin.

In many instances, when no attempt at closure is made, the wound, after the preparation described, is filled with vaseline, dressed and immobilized for many days without even inspection unless pain or fever may indicate an infection which the tissues may need some help to handle.

Infected Wounds. In the problems of an infection or an infected wound it is obvious that time will not permit me to be specific even if it were possible to deal specifically with the countless problems which arise. This subject must of necessity be dealt with in general terms.

Our only hope of aiding in the solution of these problems must be based, first, on an intensified effort to disseminate to students and doctors a thorough knowledge of the fundamental principles of wound healing as we understand them and, secondly, in an endeavor to make every act in behalf of an infected wound conform to a judgment which should be arrived at only in the light of one's best knowledge of these principles. If infected wounds were so handled there could be no criticism of thoughtlessness, of addiction to a routine or of slavery to one principle of wound healing when the application of others might be more indicated by the condition of the wound. Such an approach to these problems would at least have the virtue of wounds being treated according to the abilities of those handling them, which I fear is very far from the facts at the present time.

One thing very essential to the intelligent handling of infected wounds is a correction of the more or less prevalent feeling that such wounds are either treated or not treated depending upon whether they are operated upon and subjected to antiseptic therapy. The care of infected wounds is not by any means solely a problem of drainage and germicidal therapy. Many kinds of wound infection are often best treated by a stressing of some principle of wound healing other than that of active control of the infection. An unwillingness to cut into acute infections such as lymphangitis, furunculosis, cellulitis, where there is no suppuration may easily be justified by an avoiding of traumatization and necrosis, a refusal to open up new avenues for a spread of the infection and by a desire to observe the fundamental principle of rest. The use of moist warm dressings to prevent edema, the forcing of fluids, transfusions and various kinds of intravenous therapy, all find a rationale in an effort to improve the blood supply. A course of procedure based on such reasoning is just as much a part of the problem of treating infected wounds as is incision and antiseptic therapy. That some infected wounds such as osteomyelitis, certain types of joint infections as well as other kinds of infections may do best under a stressing of the principle of absolute rest and, as a corollary, nontraumatization has been amply proved. In general, when antiseptic fluids cannot be made to reach a part of an infected wound it is always a question whether the traumatization incident to their use justifies the harm which may result from a disregard of the value of rest.

Prior to actual suppuration it is difficult for me to justify any incisional measures in the treatment of infected wounds. It has always seemed to me that the price to be paid in the nature of traumatization, necrosis, and the opening up of new avenues for the spread of the infection, is not warranted by the good which may result from the release of tension or the establishment of drainage for subsequent suppuration. It is most unusual for this to be done in our clinic.

When, however, suppuration has occurred, sooner or later some form of external drainage or excision becomes necessary in order to avoid the damage of tension, accumulated toxins, and the spreading of the infection in undesirable directions. Deciding when to do this and how are obviously problems of such magnitude and variation that they cannot be considered. Even if it were possible to consider this phase of our problem, I would have to admit that it is impossible for me to put in writing my course of procedure. I can decide only after careful study of each individual instance of suppuration as it arises. I would venture the one generalization that radical procedure is not often a fault of the modern surgery of suppurating wounds. That it, however, should be done with the least amount of damage to the existing granulation tissue is obvious.

I realize the inadequacy of my treatment of the subject of infected wounds, but I do trust that I have indicated the necessity for carefully considering and weighing all the fundamental principles of wound healing before deciding upon a course of procedure in any given case of infection. This process should become second nature to one's mental behavior each and every time an infected wound is inspected.

Granulating Wounds. It now remains for me to make only a few comments on the treatment of open granulating wounds. My assumption will be that all of them are infected, for it is the rarest occasion to see such a wound of any size heal under the benign influence of a sterile scab.

It is obviously essential that anyone charged with the responsibility of treating a given granulating wound should have clearly in mind what he wishes to accomplish with it. If it is desired to perform a secondary closure, then intensive bactericidal therapy (with Dakin's solution in our clinic) until the wound is macroscopically free of necrosis and exhibits in the smears and cultures of its secretions a very minor degree of bacterial contamination seems clearly to be the course to follow. To us it also seems the wisest course to follow in preparing granulations for the reception of any kind of skin grafts. If the granulating surface is but a mere incident to some deep-seated more important pathologic process, such, for example, as osteomyelitis, it is often most illogical to treat it at the expense of rest and nontraumatization which may be clearly indicated for the more important underlying process. The granulations, if not interfered with, will nearly always provide adequate protection to the body against invasion of bacteria while adopting the principle of rest in treating the other condition. If, however, the time arrives when there will be no or very little sacrifice to deep healing, we believe that efforts to promote epithelization of the granulations by skin grafting or otherwise up to the point of sinus should be begun.

By far the most frequent problem in connection with granulating wounds is simply to get the epithelium to grow over the surface either from the edges or from islands of grafted skin (fig. 6). In the minds of most doctors, efforts to promote this process are regarded as cut-and-dried simple problems, but it is my belief that in the handling of this kind of a wound is to be found the greatest sinning against the principles of wound healing. Throughout the country there must be in practice literally thousands of different ways of treating such wounds and in probably over 80 per cent of the instances the granulating wounds are healing in spite of, or under the handicap of, what is being done for them. Reduced to its simplest terms the main problem is to get the granulating surface covered with the best possible medium for the growth of epithelial cells. As I have said before nature's ideal way is the formation of a sterile scab but this very rarely occurs over a large granulating surface. Thus practically all granulating wounds should be so handled that this medium will form to the best advantage even in the presence of infection, for, without any medium, the epithelial cells cannot grow.

FIG. 6. Diagram showing growth of epithelium into fibrin from skin edges and on either side of skin graft.

Dakinization or antiseptic therapy may be so thorough and energetic as to make a granulating surface practically sterile and of a most healthy, red, firm appearance and yet no epithelization will occur because the medium for the growth of cells is also dissolved away (fig. 7). Or, granulations may be so infected

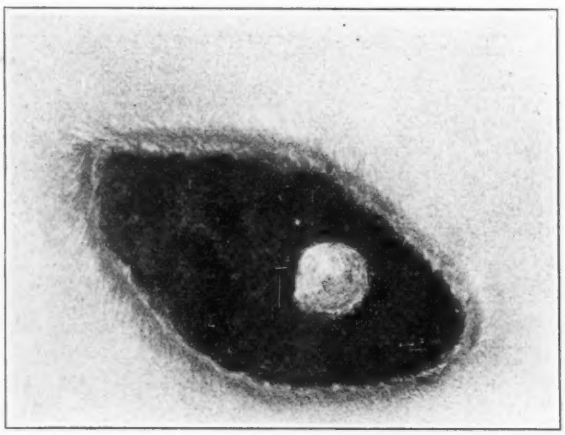

FIG. 7. A. Skin graft on an intensely dakinized wound. No fibrin. No growth of epithelium.

with bacteria which practically destroy all this medium that the growth of epithelial cells will come almost to a standstill. Again, coarse gauze placed next to the surface may at each dressing remove practically all of this medium which becomes enmeshed in it, as well as cause bleeding which opens up avenues for the spread of infection (fig. 8). Dependent

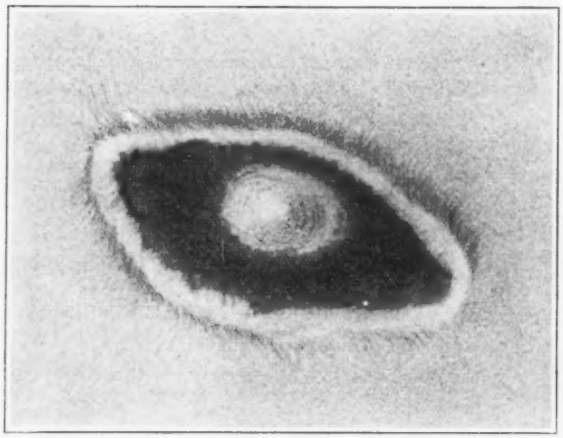

FIG. 7. B. Condition of a wound after discontinuing intensive dakinization. Note coating of fibrin which forms a medium into which new cells will grow. Epithelization has begun.

edematous parts with granulating surfaces may so interfere with circulation as to hinder the formation of this fibrinous medium as well as cause the exudation of serum which carries it away. In connection with such ulcers Billroth has this to say: "It is remarkable how rapidly the common ulcer of the leg begins to improve in appearance as soon as the patient has taken a warm bath, simply applied a wet

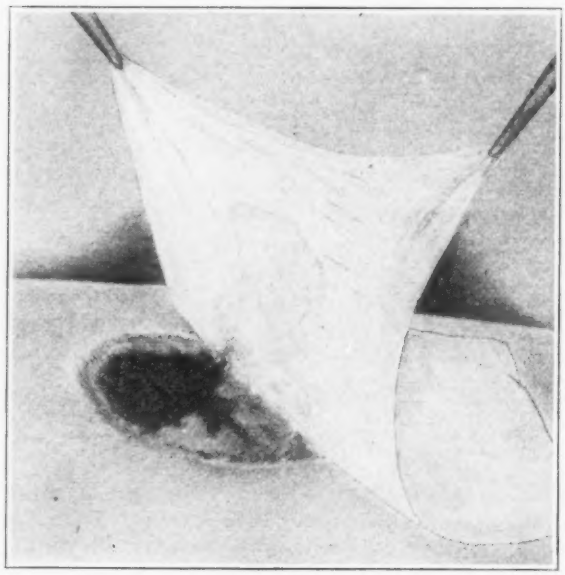

FIG. 8. A. Drawing showing effect of removal of dry gauze from a granulating wound. Note the bleeding and the removal with the gauze of the delicate fibrin covering of the wound.

compress to the ulcer, and remained in bed quietly for twenty-four hours." Time and again I have seen amazing results when the responsibility for the care of a chronic ulcer which has been dressed daily for months in a clinic has been thrown back upon the patient with advice such as that quoted from Billroth. The thick, dried, contracting dirt and sebaceous material on the skin about the ulcer disappears, the circulation improves, granulations take on a healthy appearance, fibrin forms on their surface, and epithelization takes on a new impetus. The only warning has been that under no circumstances should the granulation tissue be made to bleed. The good re-

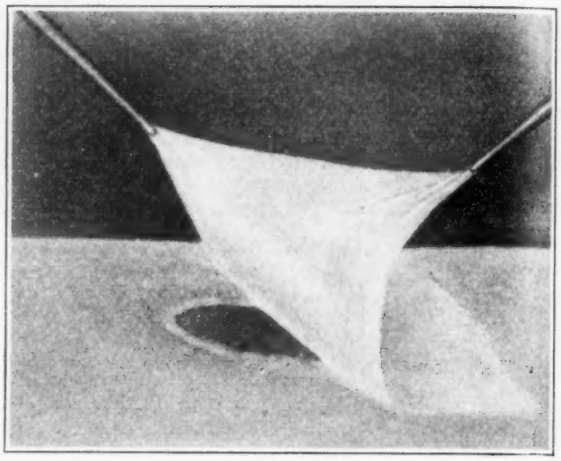

FIG. 8. B. Drawing showing the condition of a wound which has been treated by the application of vaselinized old linen. The delicate fibrin layer is not removed by this dressing.

sults are undoubtedly due to the improvement of the circulation which, in turn, improves the supply of medium for the growth of epithelial cells.

If a doctor would, therefore, treat a granulating wound intelligently, he must keep constantly in mind the process by which it must eventually heal; he must be willing to change his procedures to meet the demands of the wound. When antiseptic therapy has been pushed so far that it is stealing away the medium for the growth of cells, he must be willing to let up on its use and, vice versa, when bacteria are devouring all of it he must be willing to reemphasize the use of antiseptics. Efforts should be made to get to the wound the best possible blood supply. Dressings which stick to the wound, and then pull away the fibrinous medium, should never be employed (fig. 8). When, as occasionally happens, a nice layer of healthy fibrin is seen covering a granulating surface, every effort should be made to preserve it instead of, as I have frequently seen, to remove it (fig. 8).

SUMMARY

This paper is a plea for re-emphasis of the importance of the study and application of the fundamental principles of wound healing. It is the author's belief that the amazing progress of surgery during the past generation and a half has made our profession and the public satisfied with results which fall far short of those possible to obtain. In a large measure this progress has been the result of a knowledge of germs and of efforts to control their harmful effects in wounds. However, wound healing is not alone a problem of germ destruction. Throughout this paper it has been repeatedly stressed that the price of aseptic and antiseptic procedures frequently means the sacrifice, at a loss, of other fundamental principles of wound healing.

Among these other principles which are discussed are the gross and invisible necrosis of living cells, rest, hemostasis, blood supply, the protective value of granulation tissue and an adaptation of the knowledge gained from tissue culture to the processes of a healing wound.

Only when it becomes our constant aim to evaluate all these considerations of the problems of wound healing, both in the art of making wounds as well as in the treatment of them, will there result the greatest benefit to those whose misfortune it is to bear them.

DISCUSSION

CHAIRMAN HAYDEN: I am sure everyone here is conscious, as I am, that we have been listening to an exceptionally fine paper, one that is as valuable to the general practitioner as it is to the surgeon. The discussion will be opened by Dr. Frederick B. Sweet of Springfield.

DR. FREDERICK B. SWEET, Springfield: *Mr. Chairman and Fellows*—Some weeks ago, at my request, Dr. Reid sent me a copy of his paper. I read it twice, carefully, and it has given me particular pleasure to hear it again this morning. There is so little in the paper with which one can disagree, that its discussion becomes rather difficult. I shall, therefore, content myself with the emphasis of some of the points which seem most important.

The subject is timely, for, in spite of all the advance made by modern surgery, infection, herniation and hematomas in surgeon-made wounds are complications of not infrequent occurrence.

I have long been of the opinion that chemical germ killers are also cell killers and have used and advocated the use of normal saline solution as superior to all such chemicals.

Dr. Reid's insistence on protection of granulations and rest of the injured part cannot be too strongly commended. His entire treatment of the subject has been sane and scientific and I am sure that we have all been given a better understanding of wound healing than we had before coming here this morning.

DR. ARTHUR ALLEN, Boston: *Mr. Chairman and Members of the Section*—It is very fitting that this subject that comes to us today should be brought by one of Halsted's most illustrious pupils. Dr. Reid is amplifying and extending the ideas about wound healing and the care of wounds that Professor Halsted taught a quarter of a century or more ago.

The question of how one can add to this paper is a very difficult one to me. I, like Dr. Sweet, had a copy sent to me to read, and I immediately had copies made to pass around among my young surgical friends because I feel it is really a masterpiece on the subject.

The abuse of chemical antiseptics may be pretty well illustrated by a fracture of the patella which came into the hospital a few years ago. There was a small wound through the skin and the first aid surgeon injected two or three syringefuls of tincture of iodine through the small opening into the knee joint. This particular patient spent almost a year in the hospital and ended up with only a partially functioning joint.

Today with our knowledge of preoperative preparation so much improved, with the experience derived from the teachings of our predecessors and with our own experience in postoperative care of patients, we have yet a more important factor in the management of surgical patients and that is, surgical technic. Surgical technic is a broad term which applies to all the phases in operative surgery, whether the wounds be posttraumatic or made by the surgeon. Tissue must be handled with utmost care. We must strive to injure as few living cells as possible, whether by chemicals, pressure or by long exposure to an unnatural habitat. Dead spaces must be closed and foreign bodies must be reduced to a minimum.

This last important principle of good wound healing is well illustrated by the comparison of surgical wounds in which catgut has been used for hemostasis and sutures with those in which fine silk has been used. One will find that a thyroid wound, for instance, will have as little induration and that there will be as little stiffness in the neck within three weeks after the operation where fine silk is used as at the end of three months following the use of catgut. Also, the amount of serum to be aspirated or drained is negligible after a careful diathermy and fine silk technic as compared with the usual situation following the use of catgut. Halsted used fine silk in his wounds as did all of his pupils. General use of this material did not become popular, at least in New England. Whipple has recently brought forth very convincing arguments in favor of fine silk. The marked reduction in septic wounds following its use is explained on the scientific basis that a catgut tie and knot of equal strength to fine silk will create a foreign body reaction approximately twenty times as great.

We have in the past four years used a combination of diathermy hemostasis in the superficial tissues and fine silk on the deeper and more important vessels in all thyroid, breast and hernia wounds, with very gratifying results. We believe it is only a matter of time when fine silk instead of catgut will be very generally used in clean surgical wounds.

DR. E. L. YOUNG, JR., Boston: I want to ask Dr. Reid one question in relation to something that he said in his very excellent paper. It is the old question of the relation of syphilis to the healing of wounds. Does Dr. Reid believe that there is ever enough toxic material in the cells of the body in the presence of syphilis so that it influences the healing of wounds?

CHAIRMAN HAYDEN: Is there any further discussion? If not, Dr. Reid, would you care to close?

DR. MONT REID: I am very grateful for the splendid comments made by Dr. Allen and Dr. Sweet

concerning my paper. I do not think that I have anything more to add except that I want personally to change the statement that Dr. Allen made in regard to the use of silk. I have never used anything except silk for ligatures and sutures in clean surgical wounds, and I do not think I will ever change my attitude with respect to its use until there is developed a new and better suture material.

In regard to the effect of syphilis, I do not think there is any particular difference in the wound healing except in so far as syphilis interferes with the blood supply. If you are operating on a syphilitic patient you must make up your mind that the blood vessels are not going to be so good as they are in a normal, healthy individual, and consequently, make allowances accordingly.

I want to thank you for being so attentive to my paper, and I thank you again for the privilege of coming here and speaking to you.

CHAIRMAN HAYDEN: For the benefit of those who were not here at the beginning of the meeting I would like to say that the splints which Dr. Browne exhibited as part of his talk are available for inspection by anyone who cares to see them upstairs in the scientific exhibit. There are two papers on the program today which are founded on the mechanical ingenuity of their authors.

The next paper, by Dr. Donald Munro of Boston, is based on the use of a very ingenious instrument which he has devised. Dr. Munro is going to speak on "The Cord Bladder,—Its Definition, Treatment and Prognosis When Associated with Spinal Cord Injuries."

THE CORD BLADDER—ITS DEFINITION, TREATMENT AND PROGNOSIS WHEN ASSOCIATED WITH SPINAL CORD INJURIES*

BY DONALD MUNRO, M.D.†

INTRODUCTION: The term "cord bladder" as commonly used refers to those urinary bladders whose function is abnormal on account of disease or injury of the spinal cord. In this paper, I propose to deal only with the type of cord bladder that is associated with spinal cord injury. Under this general heading the dysfunction of the bladder has been held to extend all the way from complete retention to so-called automaticity. Therapeusis has ranged from noninterference through all degrees of urethral catheterization to suprapubic cystotomy. It has been considered successful when more or less periodic micturition has resulted, although the surgeon has usually ignored the possibility of associated residual urine. Furthermore this end-result has implied no actual knowledge of the functional efficiency of the detrusor muscle, and practically none of the storage capacity of the organ. In most cases no distinction is drawn between the varying types of spinal cord lesion which produce the vesical abnormality. It should not come as any surprise to us then that, under the circumstances, urinary sepsis is the recognized chief cause of death after the first week in any type of cord injury. Nor should we be astonished at the futility of the argument about whether, like the hen and the egg, the cystitis preceded the catheterization or the catheter the cystitis.

I propose to show from a study of a series of 105 cystometrograms selected from a total of 200 observations and made on a group of twenty-four cord injuries that cord bladders are classifiable into certain recognizable groups. Also, that, in conjunction with the use of tidal drainage as a sole therapeutic agent, an inlying urethral catheter can be kept in either male or female bladders for many months without producing urinary sepsis; and that, as a result, this fatal complication has almost been eliminated in all types of spinal cord injury. The cystometry is but a repetition of the fundamental work already done by Holmes,[1] and Denny-Brown and Robertson.[2] It has been extended, to be sure, to include the study of bladder function from within a few hours of the receipt of the cord injury to the end-result after months and years. This has, however, merely confirmed their theoretical postulates. The therapeutic application, however, is my own and is a continuation of work first published in 1934.[3]

The Cord Bladder: With adequate cystometric examination and provided the spinal cord lesion is a transection above the sacral segments, cord bladders pass through three definite stages. If the cord lesion is a hematomyelia or edema at any level, this is increased to four. Incomplete cauda equina lesions produce changes that duplicate those seen with hematomyelia. Complete cauda equina lesions or complete destruction of the sacral segments have not occurred within the scope of my experience. However, Denny-Brown and Robertson[2] have demonstrated that the bladders associated with these entities show only two sets of recognizable characteristics.

Regardless of what stage of bladder dysfunction is studied, it is measurable by certain criteria that have been set up as the result of the analysis of normal bladder activity and as determined by those same cystometric methods (figure 1). These criteria include (1) the amount of the initial rise, and the curve of intravesical pressure in response to a given amount of fill, (2) the presence, absence and

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Read at the Annual Meeting of the Massachusetts Medical Society, Section of Surgery, Springfield, June 9, 1936, and in part before the American Urological Association at Boston, May 19, 1936.

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periodicity of emptying contractions during the fill, together with the absolute amount of residual urine as expressed in terms of percentage of fill, (3) the storage capacity of the bladder, and (4) the reflex and voluntary sphincteric activity. Interpretation of these data together with an understanding of the normal neurophysiology of the urinary bladder as conclusively demonstrated by Denny-Brown,[2] Learmonth,[4] the author[5] and others will settle the question

Cystometric Findings	Average Normal Figures	Interpretation in Terms of Function
Alterations in Intravesical Pressure — Initial	2.50 cm.	Detrusor tonic response to a minimal stimulus
Alterations in Intravesical Pressure — Sustained	3.18 cm.	Detrusor tonic response to a constant stretch stimulus
Presence, Absence and Rhythmicity of Emptying Contractions	May be either present or absent	Efficiency of detrusor contractions and the presence of inhibitory impulses from higher levels
Amount of Residual Urine in % of Fill	0%	
The Amount of Fill before the First Emptying Contraction	70% have over 200 cc.	The storage capacity of the individual bladder
Activity of the Anal and Bulbocavernosus Reflexes	Active	The reflex of the external urethral sphincter
Resistance to Passage of Urethral Catheter	Active	Measure of voluntary control of external urethral sphincter and therefore voluntary inhibition of micturition

FIGURE 1.
Interpretation of Cystometric Criteria in Terms of Function.

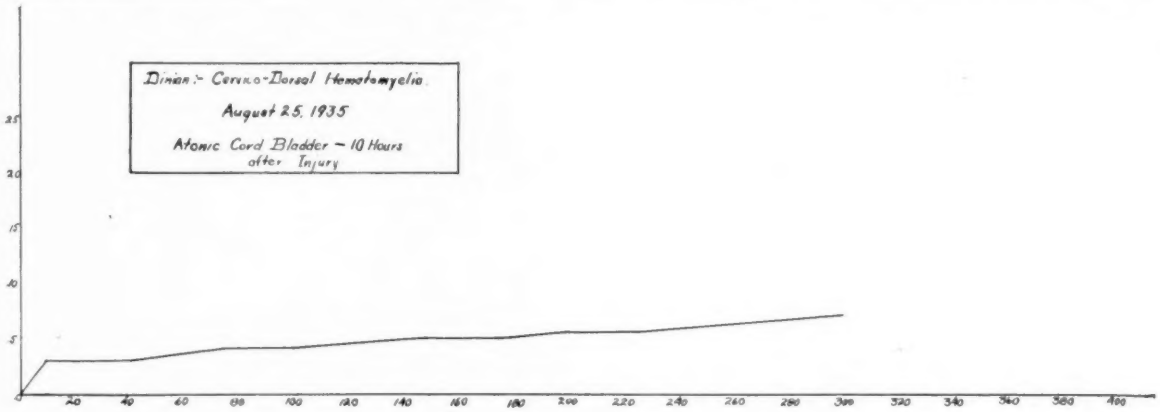

FIGURE 2.

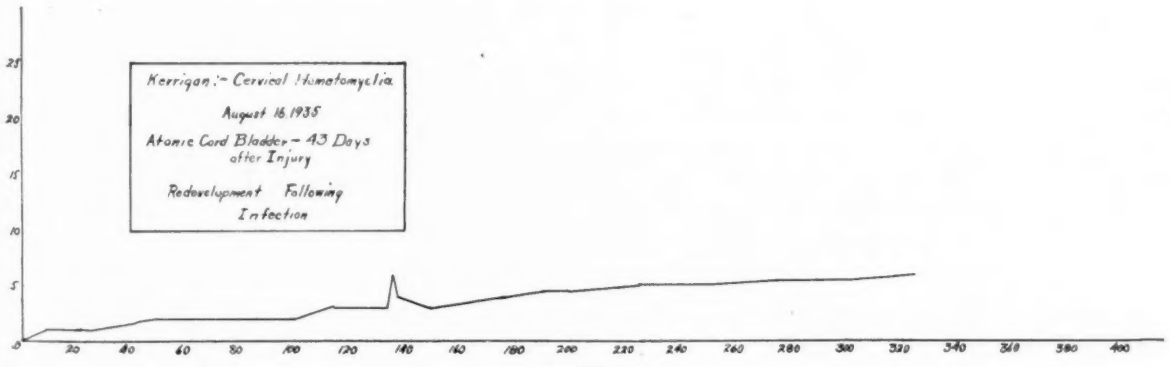
Kerrigan:- Cervical Hematomyelia
August 16.1935
Atonic Cord Bladder – 43 Days after Injury
Redevelopment Following Infection

FIGURE 3.

of, (1) the presence and degree of tonus of the detrusor muscle, and its reflex response in terms of contraction. This will apply to both minimal sensory and constant stretch stimuli. (2) The efficiency of the emptying contractions, and their inhibition by impulses from higher centres. (3) The storage capacity of the individual bladder, and (4) the degree of reflex facilitation or voluntary inhibition of micturition.

The Atonic Cord Bladder (figure 2): The atonic form of cord bladder is present at the beginning of every spinal cord injury and during the period of spinal shock. It also recurs after any degree of recovery of bladder function with the occurrence of any major infection (figure 3) or in the presence of a high degree of general exhaustion. Its presence is due to the areflexia accompanying these conditions and affecting chiefly those segments in the region of and below the level of greatest cord damage. Normally the fundamental activity of the bladder depends on the integrity of the sacral spinal reflex arcs. In the presence of areflexia this activity ceases and atonicity sets in. This atonic group, to be sure, merges imperceptibly into the succeeding type of cord bladder activity but the average findings are characteristic and peculiar to the group (figure 4). Such a bladder has complete retention up to the point of extreme distention. The detrusor muscle is atonic and at most shows only the curve of distention of an elastic bag. Emptying contractions are completely absent, and the residual urine comprises 100 per cent of the fill. The storage capacity is limited only by the passive distensibility of the bladder wall. There is neither voluntary nor reflex activity of the external urethral sphincter. Treatment is best carried out by placing the patient on tidal drainage[3] with the intravesical pressure level set at from 2-5 cm.

Autonomous Bladder (figure 5): As the patient begins to recover from his spinal shock and, provided no major infection or exhausting procedure such as an operation intervenes, his atonic bladder gradually changes into the second one of the cord bladder groups. This second stage is present in all forms of spinal cord injury and in addition is said by Denny-Brown and Robertson[2] to be the end stage in those patients who have had a complete destruction of either the sacral spinal segments or the cauda equina. With the central origin of the vesical nerve supply in mind it will be seen that these latter conditions constitute external denervation of the bladder. In any case, whether this denervation is temporary or permanent and in

Cystometric Criteria		Cystometric Data			Normal Cord Bladder		Normal Bladder
		Atonic Cord Bladder	Autonomous Cord Bladder	Hypertonic Cord Bladder	Transected Spinal Cord	Other Cord Injuries	
Initial Tonus in cm.	High	8 1/2	11	53	19	12	8
	Average	1 3/4	5 2/5	16	7	3 3/4	2 1/2
	Low	0	0	3	1	0	0
Average Change in Tonus with Fill	Of 400 cc. and over	+ 6 3/4	+ 9 2/5	+ 23 1/2	— 1.85	+ 1.04	+ 3.54
	Of 300 cc. and over	+ 5 3/4	+ 8 1/4	— +	— 1.96	∓	+ 3.40
	Over 0	—	—	16	2.09	1.5	—
	To First Contraction Only	—	—		— 2.5	— 0.5	+ 3.18
Emptying Contractions	Present	0	14	26	24	29	14
	Absent	9	3	0	0	0	16
Capacity for Storage in cu. cm.	Over 400 cc.	5	7	6	0	1	11
	300-400 cc.	4	6	7	0	1	7
	200-300 cc.	0	1	7	1	11	4
	100-200 cc.	0	2	4	8	7	3
	50-100 cc.	0	0	0	9	8	3
	0-50 cc.	0	1	3	6	1	3
Average Amount of Residual Urine	% of Fill	82.5%	42.6%	19.5%	5.97%	16.2%	0%
Anal and Bulbocavernosus Reflexes	Present	0	Insufficient Data	Insufficient Data	Insufficient Data	29	30
	Absent	9				0	0
Resistance to Catheter	Present	0	0	0	0	29	30
	Absent	9	17	26	24	0	0

FIGURE 4.

spite of the continued segmental areflexia, the detrusor muscle and internal sphincter now exhibit signs of activity. This is due to impulses transmitted through a reflex arc whose efferent and afferent arms are both parts of the neural plexus that lies wholly within the vesical wall. Apparently this intramural mechanism takes control of the detrusor contractions even though not reach these bladders from the higher centres and both the voluntary and reflex activities of the external sphincter are absent. Infection or exhaustion may cause an autonomous bladder to revert to an atonic form. As an end-result following sacral or cauda equinal destruction these bladders are described[2] as being hypertrophied, and incapable of storing any signifi-

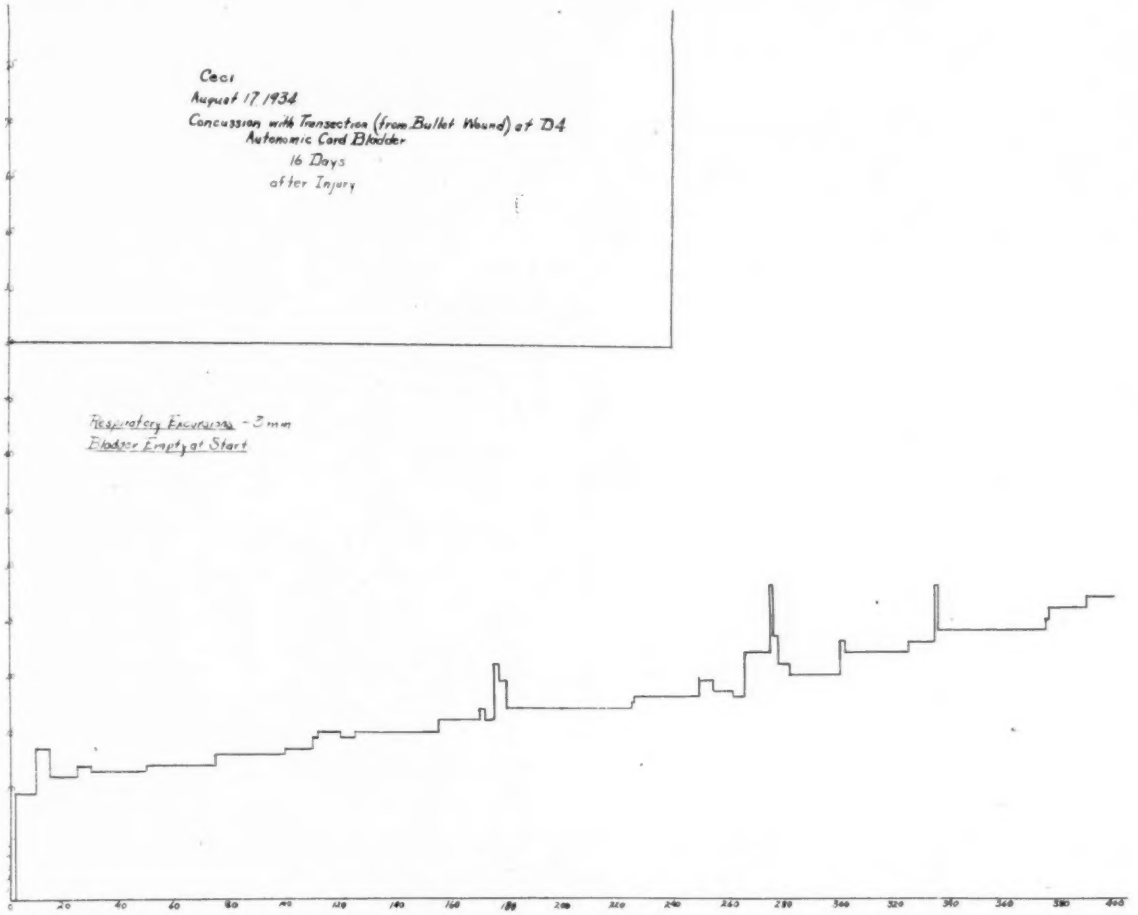

FIGURE 5.

the bladder is completely disconnected from the central nervous system. Such a bladder is therefore autonomous or self-governing and as such may be spoken of as the autonomous or autonomic stage of the cord bladder. These detrusor contractions, however, may be only sufficient to cause a reciprocal relaxation of the internal sphincter and may not reach a size sufficient to produce emptying other than by leakage. The symptoms of this stage are therefore those of overflow distention (figure 4). Cystometrically the initial tonus is about five times that of the atonic type and the rise of the sustained tonus averages 8 1/4 as opposed to 5¾ cm. Emptying contractions are inefficient or may be absent and there is over 40 per cent of residual urine. The storage capacity is over 300 cc. in 76 per cent. Inhibitory impulses do cant amount of urine. The patients have a practically constant urinary dribble. I have only had experience with treating the acute type. They can be handled best by tidal drainage[3] with the siphon set to discharge at a medium intravesical pressure, that is, 10 to 15 cm. The autonomous bladder is present in all types of cord injury, but is never seen in the presence of a normal central nervous system.

The Hypertonic Cord Bladder (Figure 6): Further progress toward recovery is seen in the third stage of cord bladder—the hypertonic cord bladder. This is present in all types of spinal cord injury except those with sacral and cauda equinal destruction. In the presence of either general infection or exhaustion it may revert to either the autonomous or atonic forms. In its earlier development it merges with the auton-

omous type just as in its later stages it tends to become more like the next succeeding uninhibited type. It is essentially a condition in which the segmental spinal reflex activity is again manifesting itself but in a completely uncontrolled manner. Such a bladder empties itself at irregular intervals and the patients are constantly wet unless they are on tidal drainage (figure 4). The initial tonus of the detrusor is on an average sixteen times that of the atonic bladder and may go as high as fifty-three times. The rise of sustained tonus averages 23½ cm.—four times higher than that of the atonic bladder. Emptying contractions are constantly present and the residual urine amounts to only 19 per cent of the fill. The storage capacity of slightly more than half the cases is below 300 cc. There is no inhibition of contractions and the reflex and voluntary control of the external sphincter are probably absent in the transections and vary in the other types of cord injury. Treatment is best carried out by tidal drainage[3] with the apparatus set to give a high (20 to 30 cm.) intravesical pressure. Because of this high pressure and the resultant interference with the drop mechanism on the apparatus a rubber flutter valve mounted on a T tube must be introduced into the line just below the glass dropper. Under other conditions of treatment the storage capacity of these bladders is materially impaired in a very short time.

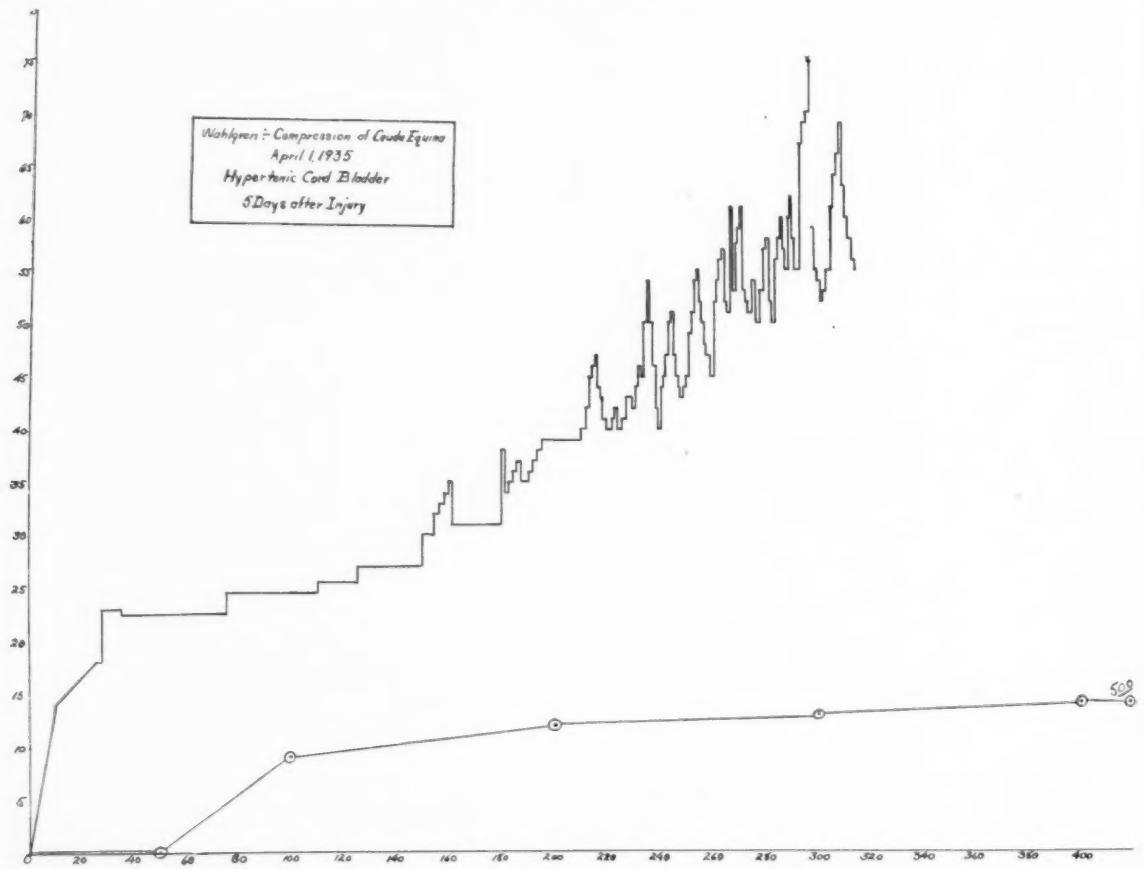

FIGURE 6.

Normal Cord Bladders: If progress is not interfered with by injudicious or insufficient treatment, the hypertonic cord bladder is succeeded by the normal cord bladder. These are of two types depending on the nature of the original cord injury. Although, in the last analysis, both types may be considered objectively and subjectively normal by the ordinary tests, it is possible by the comparison of cystometrograms of these bladders with those of known normal bladders to show differences in function between the two. I have differentiated them, therefore, as normal *cord* bladders in preference to speaking of them as normal bladders.

The Uninhibited Normal Cord Bladder (figure 7): The simplest of the normal cord bladders is the uninhibited. It is present in all forms of cord injuries except the destructive lesions of the sacral segments and cauda equina. It is the normal end-result as far as vesical function goes in all cases of complete or nearly complete transection of the spinal cord above the level of the sacral segments. It probably represents what has been loosely spoken of in the past as the "automatic bladder" and is actually the ex-

pression of the normal fundamental uninhibited reflex activity of this organ. Subjectively and objectively, except by cystometry, it appears to be a normal bladder that empties itself completely at more or less regular time intervals (figure 4). The initial tonus is three times that of the normal bladder. Instead of rising, fluid intake and must be so arranged as to permit him to retain his bladder contents without leakage for as long a time as possible. In transection cases this is the best end-result that can be hoped for. As a result the patient must be prepared to continue on this régime for the rest of his life.

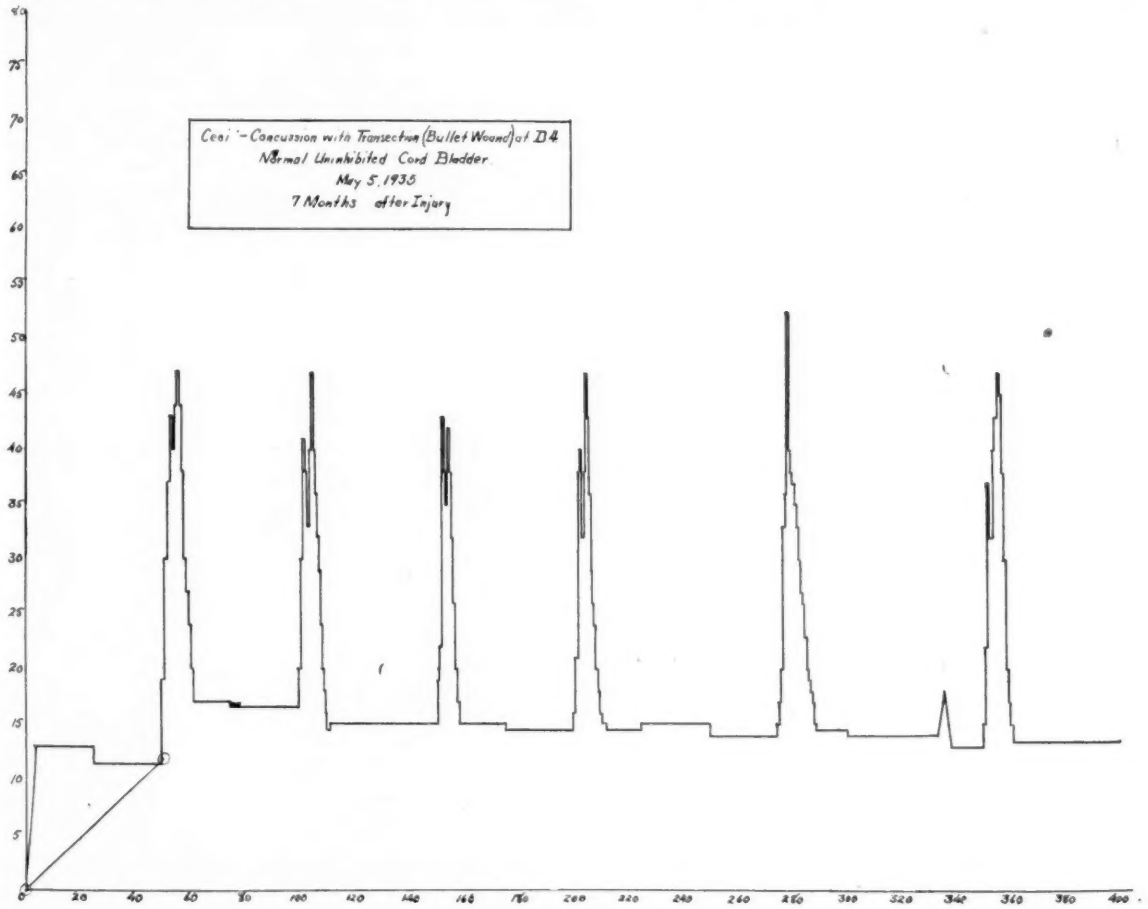

FIGURE 7.

the sustained tonus falls to slightly below the starting level. Emptying contractions are constantly present and there is an average "residual" of only 6 per cent of the fill. The storage capacity is below 200 cc. in 90 per cent of the cases. Since no inhibitory impulses reach the bladder the emptying contractions are remarkably rhythmic and regular in occurrence. The external sphincteric activity is reflexly normal but is not under voluntary control. Treatment is based on the use of a retention catheter. This is opened by the patient at intervals during the day and is attached to a tidal drainage apparatus[3] at night. This catheter, just as in all the other types of cases treated by tidal drainage, is removed, cleaned and replaced once a week. The length of the interval during which the catheter is shut off and the bladder allowed to fill is determined by experiment and varies with each patient. It will be influenced by the

The Normal Cord Bladder (figure 8): In all other types of cord injury this uninhibited cord bladder goes on to a stage that differs from normal only cystometrically. The ability to inhibit emptying contractions is gradually regained and, subjectively, control of micturition is again complete. This requires a period of re-education, however, and treatment must be directed with that end in view. As a first step the bladder is drained at regular increasingly prolonged intervals. In this way the storage capacity will be increased and normal inhibitory impulses will be stimulated. In addition, whenever emptying is permitted, the catheter is only opened part way and the patient is made to expel his urine actively against a positive pressure. This serves as a further aid in helping him regain normal control of micturition. If possible these procedures are carried out with the patient in the upright position. Tidal drain-

age[3] is used at first only at night and then dispensed with entirely. As soon as the patient can go three hours between emptying periods without leakage and provided he can of his own action completely empty his bladder against positive pressure the catheter is removed. A further interval of training along the above lines follows with the idea that full nocturnal control and adequate day control shall be considered normal.

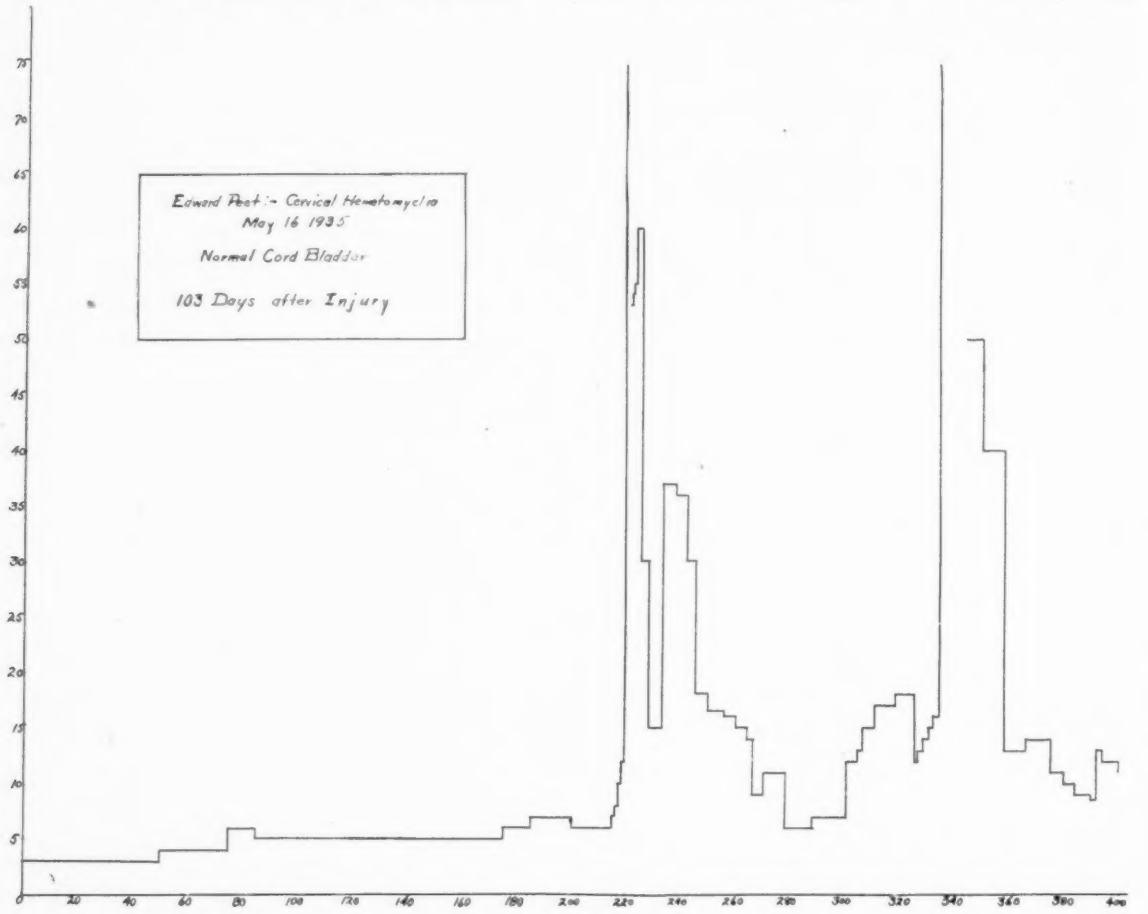

FIGURE 8.

Kidney function measured by intravenous pyelogram, phenolsulphonephthalein test, a retrograde pyelogram following cystoscopy, and repeated chemical and cytological examinations of the urine have proved to be normal in all such cases. Cystometrically, however, there still appears a variation from normal (figure 4). The initial tonus is slightly higher than normal. The sustained tonus rises only 1 cm. as compared with a normal 3½ cm. in 400 cc. of fill. Emptying contractions may or may not be present in the normal bladder with this fill but are always present when 400 cc. is put into the normal *cord* bladder. Also, in the latter, residual urine is present to the extent of 16 per cent of the fill as opposed to a complete absence in the normal. The storage capacity is definitely greater in the normal bladder.

Summary of Types of Cord Bladder (figure 9): The data detailed above have been collected from a group of twenty-four cases of all types of cord injuries exclusive of those in whom total denervation of the bladder due to destructive sacral or cauda equinal lesions was present. Thirteen were followed to their end point. Five wound up with an uninhibited cord bladder, all being dorsal transections. Their end points were reached at seventeen months, twenty and a half months, twenty-five months, four years, and seventeen years after injury. The first three were seen and cared for from the start. Of the other two, one was first seen one year and the other seventeen years after injury. The only patients of these five to have abnormal genito-urinary tracts were these last two. The more recent had a severe pyelonephrosis which eventually proved fatal and the other a chronic cystitis which is at present under treatment. Out of the remaining three one died of septicemia about one and one-half years after injury with proof at autopsy that his genito-urinary tract was normal and that the septicemia was due

to a septic hip joint and psoas abscess. The other two are living, one at home in a wheel chair and the other in the hospital on his way to a wheel chair existence. Both have been demonstrated to have normal anatomical and functioning kidneys, ureters and bladders by all the usual forms of genito-urinary tract examinations.

Eight other patients had subjectively normal bladders at discharge. Their neurologic damage included five cervical hematomyelias, one cervical edema and two compressed cauda group of twenty-four, nine died from their cord injuries. In these it was possible to demonstrate before death the presence of an atonic bladder alone in four, an autonomous bladder alone in one, an atonic followed by an autonomous bladder in one, and autonomous followed by a hypertonic bladder in two, and a hypertonic bladder alone in one. The other two cases are still under treatment for hypertonic bladders. This condition was present on their admission and dates back to injuries sustained nine and eighteen years previously.

Type of Injury	Site of Injury	Atonic Cord Bladder	Autonomous Cord Bladder	Hypertonic Cord Bladder	Normal Uninhibited Cord Bladder	Normal Cord Bladder	Interval Between Onset and Date of Death or Discharge
Transection	Cervical	1					24 hours
Transection	Cervical	1					7 hours
Transection	Cervical	1					5 days
Transection	Dorsal				1		17 months
Transection	Dorsal		1		1		20 months
Transection	Dorsal			1	1		4 years
Transection	Dorsal				1		2 years
Transection	Dorsal				1		17 years
Hematomyelia	Cervical		1				29 days
Hematomyelia	Cervical					1	4½ months
Hematomyelia	Cervical					1	20 days
Hematomyelia	Cervical	1	1				31 days
Hematomyelia	Cervical	1		1		1	4 months
Hematomyelia	Cervical	1					14 hours
Hematomyelia	Cervical	1	1			1	6 months
Edema	Cervical					1	24 hours
Hematomyelia	Cervical		1	1		1	3 months
Contusion	Dorsal			1			3 days
Compression	Cauda		1	1			18 days
Compression	Cauda		1	1		1	23 days
Compression	Cauda					1	3½ months
Compression	Cauda		1	1			3 months
Compression	Cauda		1	1			9 years
?	Sacral			1			18 years
Totals		7	9	9	5	8	

FIGURE 9.
Distribution of Types of Cord Bladders.

equinae. They have all been proved by cystometric and other types of genito-urinary examination to have normal cord bladders. This end point was reached four and one-half months, twenty days, four months, six months, twenty-four hours, three months, four months and three months after onset. All were seen at once on receipt of injury except one of the cauda equina cases which was first seen at three months and one of the cervical cases which was first seen at three weeks. One patient showed successively an atonic, hypertonic and then normal cord bladder; one an atonic, autonomous and normal; and two an autonomous, hypertonic and normal cord bladder in the course of their recovery. Three had normal cord bladders at the first examination. All are now living and active with varying degrees of neuromuscular disability.

Of the eleven cases remaining from the whole

Treatment: In the course of treating these bladders with tidal drainage,[3] certain data having to do more particularly with the technical aspects have become evident. Perhaps the most important is that with this method of treatment the problem of nursing these patients has been simplified to an astonishing degree. If the apparatus is properly adjusted to the type of bladder that is involved, these patients should never be wet. In this series, decubitus ulcerations have occurred only four times despite the fact that all the patients except two were kept on ordinary mattresses supplemented in perhaps one-half of the cases by rubber air rings or lamb's wool skins. Three of these four were wet in contradistinction to the other twenty-one who were consistently dry. In one this was due to the patient's persistently removing his catheter, and in one because the tidal drainage was set for an autonomous bladder when

actually the bladder was hypertonic. As a result there was leakage about the catheter. Another had treatment carried out by an early and inefficient apparatus. In the last the decubitus ulcer was already present before he came into my care and did not heal before death in spite of being kept dry. This ability to keep the patients' backs dry and therefore in good condition has proved valuable in other instances also. For example, in a child of nine with *Streptococcus hemolyticus* meningitis from a compound fracture of the skull, it was necessary to do a lumbar puncture every four hours. During the first week of treatment and while the patient urinated into the bed, every puncture wound became a small abscess. For the next four weeks his back remained dry. During this time he was on tidal drainage. Under these latter conditions, one hundred and thirty-four lumbar punctures were done and no sepsis of any kind developed in any of the wounds.

There are also certain unfavorable complications that have arisen from the use of this apparatus. The most important have to do with the catheterization of male patients. Two periurethral abscesses from ruptured urethras have occurred. These resulted directly from attempts at catheterization with stiletted catheters. This was possible because of the anesthesia due to the cord lesion, but is an inexcusable complication. Acute epididymitis has also occurred. It has always subsided with withdrawal of the catheter until the temperature and tenderness have disappeared. Because these complications could be traced in each instance to the use of too large a catheter—sizes even up to 29 F. having been used—I have not considered it necessary to tie the vas in any case. The oversized catheter was always used in an attempt to prevent leakage about it. This failed in every case until the constantly present but unrecognized maladjustment of the tidal drainage apparatus to the type of bladder being treated had been put right. I have found no contraindications to the intelligent use of this apparatus. However, failure will follow if variations from the standard set-up are permitted. The catheter must be a rectal tube, the irrigator must be at least 30 cm. above the glass dropper which, in its turn, must be higher than the apex of the siphon curve, the internal diameters of the various tubings must be of the sizes specified and the preserve jar reservoir must be set at such a level that the horizontal arms of the T tubes come 20 cm. below the bladder level. Intravesical pressure must be maintained at the level proper for each different type of bladder, varying from the 2 to 5 cm. of the atonic bladder to the 20 to 30 cm. of the hypertonic bladder. The rubber flutter-valve must be inserted just below the dropper in all instances in which the bladder is hypertonic. The apparatus will not work properly, regardless of appearances, unless these requirements are met and, only then, if respiratory waves are constantly visible in the air vent or manometer tubing, if the preserve jar empties completely at each cycle and if the siphon effect is broken by the entrance of air only through the air vent or manometer tubing.

Type of Treatment	Totals	Genito-Urinary Tract Infection			Final % of G. U. Tract Infection
		Incidental to Treatment	From Technical Errors	Present Before Being Seen	
Without Tidal Drainage	33	24			73%
No Urine Examination	16				
With Tidal Drainage	26	4	2	1	15%

FIGURE 10.
End-Result Chart.

Results (figure 10): In the past six years, seventy-five spinal cord injuries have been admitted to the neurosurgical service of the Boston City Hospital. These have been divided as follows: forty-six cervical, twenty-one thoracic and eight lumbosacral or cauda equinal. In addition there have been eighteen suspected cord injuries in patients who, on investigation, proved to be suffering from bony damage only. Of the seventy-five, sixteen have been eliminated from this end-result study because no urinary examinations were available. Thirty-three were seen before tidal drainage was in use. In this group all the usual other types of treatment as applied to the bladder were tried. They included constant and interrupted catheter drainage, complete absence of any drainage of any type and suprapubic cystotomy. Urinary infection was considered present when clumps of white blood cells were seen in microscopic examination of the urine just before the patient's death or discharge or when such infection was found at autopsy. Under these conditions urinary tract infection was present in 73 per cent. There are twenty-six cases in the more recent group. These have all been treated either in whole or in part by tidal drainage. The same diagnostic standards as given above were used in determining the presence of genito-urinary tract infection. In addition three cases were excluded—one which not only entered with but was dis-

charged with cystitis, and two others that developed periurethral abscesses after improper catheterization. Under these conditions and with the only significant change a shift from the older methods of treatment to tidal drainage, the incidence of urinary infection dropped to 15 per cent.

Conclusions:

1. For purposes of diagnosis, prognosis and treatment, "cord bladders" resulting from all types of spinal cord injuries should be divided into four distinct groups.

2. These may be measured cystometrically against normal bladder activity in terms of initial and sustained tonus, presence and periodicity of emptying contractions, the absolute amount of residual urine expressed in terms of percentage of fill, the storage capacity of the bladder and the reflex and voluntary sphincteric activity.

3. With these criteria, "cord bladders" are atonic, autonomous, hypertonic and normal.

4. The only permissible end-result of any "cord bladder" that results from spinal cord injury, is either an uninhibited cord bladder in cases of spinal cord transection above the sacral segments; an autonomous cord bladder in cases of destructive lesions of the sacral segments or cauda equina; or a normal cord bladder in all other spinal cord injuries.

5. All types of cord bladder are amenable to treatment by tidal drainage provided the apparatus is adjusted to suit the type of bladder being treated.

6. Except for complications due to misuse of the apparatus, tidal drainage as a method of treatment of cord bladders of any type has no contraindications.

7. Indwelling urethral rectal tubes used as catheters, or mushroom catheters, may be employed indefinitely in conjunction with tidal drainage in either male or female urethras without producing cystitis or urethritis. They must be removed, cleaned, and replaced once a week and care must be taken to avoid the use of too large sizes.

8. The incidence of decubitus ulcerations is greatly reduced and the problem of nursing the patient with a spinal cord injury is greatly simplified if the patient is kept dry by the proper use of tidal drainage.

9. The incidence of all types of urinary tract sepsis in spinal cord injuries has been reduced from 73 per cent in thirty-five cases to 15 per cent in twenty-six cases through the prompt, intelligent and routine use of tidal drainage in the care of the bladder.

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DISCUSSION

CHAIRMAN HAYDEN: The discussion will be opened by Dr. James A. Seaman of Springfield.

DR. JAMES A. SEAMAN, Springfield: *Mr. Chairman and Fellows of the Society*—It is a very great privilege indeed to discuss such a very fascinating paper as Dr. Munro has presented to you this morning. One is naturally impressed with the outstanding contribution which he has made in the diagnosis and treatment of cord bladders due to cord injury—and please note that the treatment is original. It is quite likely that none of us have been impressed with the former methods of handling these cases—allowing the bladder to fill and overflow, leaving the patient constantly in a puddle with its attending bedsores and difficult nursing problems. Even suprapubic drainage and the catheter and clamp now seem as outmoded as the Model T Ford. But these methods did not attempt to determine the type of bladder with which one is dealing. The classification of cord bladders is tremendously important. It is quite necessary to know whether one is dealing with an atonic cord bladder, autonomous bladder, or a hypertonic cord bladder, a normal cord bladder or an uninhibited normal cord bladder. Intelligent treatment can be based only upon a knowledge of these facts. Strictly speaking, these bladders should have cystometric readings done on them. To all intents and purposes the apparatus itself is a great aid in determining the type of bladder. Each type mentioned requires a different adjustment for allowing bladder pressure.

This apparatus Dr. Munro has shown to you seems quite involved but is, in reality, quite simple, utilizing, very effectively, a few fundamental hydraulic principles, such as the introduction into the system of a small reservoir, equipped with an air vent, which receives irrigating fluids as they drop from the container, also the scheme to have the siphon come off between the reservoirs and the bladder and, again, the provision of tubing, through which the bladder empties, with a diameter at all points at least twice that of the tubing which empties into the reservoir. The alternate filling and emptying again by siphonage and gravity follow automatically with the set-up. It is really ingenious. It handles the problem of residual urine as no other method does. I do hope that, in his closing, Dr. Munro will throw on a slide and explain to you a little more in detail just how this apparatus works.

For a long period the indwelling catheter—the bête noir of the urologist—has been a problem. The author quite properly recognizes the importance of the toilet of the urethra in the prophylaxis against complication. Even with this prophylaxis, however, epididymitis and urethritis are bound to occur, because these spinal injuries do not usually occur with aseptic prostates, bladders and urethras. There will always be a large number with chronic prostatitis in which an indwelling catheter for a long period of time is going to be a menace. Possibly this can

be obviated somewhat more by using the new Wappler catheters, particularly the one made by Hatch which has a little tube running down the side for the instillation of medication in the deep urethra for prophylaxis against complications. I see no reason for doing a vasoligation on these patients. Very often the ligation of a vas in itself causes an epididymitis, particularly where there is a certain amount of vasitis existing. One important thing is to keep the catheter in place without moving, and I think this little technicality can be pretty well handled by the proper taping of the catheter to the shaft of the penis and running the tape up the groin. It absolutely prevents any manipulation of the tubing or the catheter being pulled by the patient and being dislodged.

A number of these patients will have, to begin with, a chronic prostatitis, a fibrosed bladder neck or prostate, a diverticulum or some complication of the lower or upper urological tract. They will have to be dealt with before the end-result will be thoroughly satisfactory. Cystoscopy early in the condition will help to determine these facts. There should be no hesitancy in doing a cystoscopic examination. Under the proper aseptic technic there should be no fear whatever. Intravenous urography can be utilized.

The essential thing is to institute tidal drainage at the earliest possible moment, before severe infection develops. Drainage should be started early in the state of final shock. Irrigating fluids may be a weak potassium permanganate solution, sterile water or whatever you will. The system permits easy medication of the bladder and I am thoroughly convinced that it keeps the bladder clean by the continual lavage. One should be sure that the ureteral orifices are not relaxed, thus permitting back flow up to the kidneys.

The bladder is supplied by three sets of nerves—the sympathetic (hypogastric) nerves, the parasympathetic (pelvic) nerves and the somatic (pudic) nerves.

Our knowledge concerning the sympathetic pathway is incomplete. Probably it connects with the spinal cord between the second dorsal and the third lumbar spinal segments, inclusive. Physiologically the sympathetic pathway controls the mechanism of bladder filling, since its stimulation causes the contraction of the sphincter (trigonal) area and inhibition of the detrusor muscle.

The parasympathetic nerves are connected chiefly with the second and third sacral nerves. They control the mechanism of bladder emptying, since their stimulation produces increased tonus of the detrusor muscle and inhibition of the vesical sphincter.

The somatic nerve arises from the third and fourth sacral segments and represents the voluntary aspect of micturition. The nerve supplies the external sphincter and the deep urethral area. The two autonomic pathways carry impulses which produce antagonistic effects. To be sure this has been questioned by some investigators. The pathologic physiology of most neurogenic disorders of the bladder is essentially a loss to the fine balance existing between the two mechanisms. Apparently this method of tidal drainage is an effort to correct this imbalance until recovery can take place.

In the tabetic bladder the pathology is different. Here both sensory and motor (parasympathetic) pathways are involved, and a parasympathetic stimulation with a drug like mecholyl is ineffective. A sympathetic inhibitor, such as ergotamine, might be used to overcome the sphincteric block, but there is always the danger of ergot poisoning in cases so treated. It would be interesting to know if Dr. Munro has used any of these sympathetic or parasympathetic stimulants effectively.

In some of these bladders that are incapable of emptying completely as a result of injury to any portion of the parasympathetic pathway from traumatic myelitis, spinal bifida or cord tumors, it would seem reasonable to suppose that the intact sympathetic contribution to vesical innervation would prove too effective a brake for the diseased parasympathetic innervation and that a presacral neurectomy—since the sympathetic system supplies the motor nerves of the sphincter and muscle—would balance the stimuli of emptying with those of urinary retention.

In my humble opinion this new apparatus offers great possibilities, and I do not believe its value has been as yet thoroughly evaluated. It is possible that it can be used more and more in other types of so-called medical bladders. I know it has proved its usefulness in tabetic bladders, in those of multiple sclerosis and in that other type of cord bladder of which we are hearing a little bit more recently, that is, the diabetic cord bladder. It seems as though it might also have an indication in those conditions following prostatectomy where the bladder has contracted down considerably, to train the bladder to hold more and more and to overcome the frequency during the few months following prostatectomy. Dr. Munro has said its chief function is in the cord bladders due to cord injury. It would seem that everybody who is likely to run into this type of injury—the general surgeon, the orthopedist and the medical man—would gain considerably by familiarizing himself with its technic. The one bugbear of these conditions, the complications, can be avoided, so that the patient may be left with the best possible type of bladder, the normal cord bladder.

CHAIRMAN HAYDEN: The paper is open for general discussion.

DR. HERBERT H. HOWARD, Boston: Dr. Munro's tidal drainage apparatus fulfills a long-felt want at the Boston City Hospital. Not only the general surgeons, but the members of the Neurosurgical Service, prior to the time this apparatus was put into use, threw up their hands at all of these cases because they remained in the ward for weeks and weeks, many of them developing an ascending pyelitis and some of them never leaving the hospital, not on account of the injury to the cord but on account of infection in the genito-urinary tract. Strangely enough I have never seen any cases complicated by an epididymitis following their being put on drainage and, if Dr. Munro has had any such complications, it has been without my knowledge. All I can say is that on the Urological Service we have not had any such complications.

Tidal drainage is not only of great value in cord lesions but I believe that it has a distinct place in urology. For the past year and a half we have found it very successful in the pre-operative treatment of cases of prostatic obstruction where there has been a reflux in one or both ureters causing either a unilateral or bilateral pyelitis. In this type of case the patients have been put on tidal drainage over a period of from one to three weeks and in every single instance the infection in the kidneys has either entirely cleared up or has been greatly diminished so that they have been made perfectly good operative risks. We have used, in these cases, acriflavine rather than boric acid solution or potassium permanganate.

This method is also of great value in cases of incontinence with small contracted dirty bladders,

due to destruction of the vesical sphincter following transurethral operations, and in cases of spina bifida, prior to any operative procedure for the relief of the same. With tidal drainage the urinary bladder in this type of case can be dilated and the infection in the bladder practically cleared up. With the contracted irritable bladder in renal tuberculosis, providing that a resection of the presacral nerve is done prior to tidal drainage, it offers the patient considerable relief from his marked frequency. I am sorry Dr. Munro did not have time to discuss this type of case in his paper.

I do not believe that tidal drainage has any place in the contracted malignant bladder. I have tried it out on several cases and cannot see that the bladder capacity has been in any way increased; furthermore, it causes a great deal of discomfort to the patient.

CHAIRMAN HAYDEN: I will now ask Dr. Munro to close the discussion.

DR. DONALD MUNRO: I have only one word to add, in addition to thanking Dr. Seaman and Dr. Howard for their kindly discussion and comments.

In regard to Dr. Howard's question about epididymitis, I am obliged to report that we have had cases of epididymitis. This complication has been covered in the body of a paper, a portion of which I was forced to omit through lack of time. This has been due, in every case, to the use of too large a catheter.

I am perhaps going somewhat out of my proper field in making the following comment, but it is based on experience which has been convincing to me. The comment is that I believe the problem of residual urine to be synonymous with that of infection of the bladder. Any method of treatment that will eliminate residual urine will also obviate the occurrence of cystitis. As a corollary to this, it appears plain to me that the use or nonuse of the catheter has little to do with the complication of bladder infection. In support of this I can report that, although the figures do not show in my paper, I have, nevertheless, had both male and female patients who have worn indwelling catheters for over two years without cystitis. This is, in my opinion, due only to the fact that residual urine was never allowed to collect. Thanks to the constant use of the tidal drainage apparatus.

CHAIRMAN HAYDEN: Is the Nominating Committee ready to report?

CHAIRMAN OF THE NOMINATING COMMITTEE: The Committee recommends the name of Dr. Frederick S. Hopkins of Springfield for Chairman of the Section, and that of Dr. Augustus Thorndike, Jr., of Boston, for Secretary.

CHAIRMAN HAYDEN: Are there any further nominations? If not, I will ask the Secretary to cast one ballot for the election of the officers as read.

(The Secretary cast ballot for the election of officers for the coming year.)

We have been aware, for many years, of Dr. Truesdale's great interest in the subject of diaphragmatic hernia, of his long-continued, conscientious work in behalf of those afflicted with this condition, and of his efforts in creating interest in this subject throughout the country. I wrote Dr. Truesdale some time ago and asked him to present a paper on this subject, but he felt that he would prefer to discuss this paper of Dr. Joseph H. Marks of Fall River entitled "Roentgen Ray Findings in Diaphragmatic Hernia."

ROENTGEN RAY FINDINGS IN DIAPHRAGMATIC HERNIA*

BY JOSEPH H. MARKS, M.D.†

Mr. Chairman, Members of the Massachusetts Medical Society—

I AM sincerely grateful to Dr. Hayden for the invitation to come before you this morning. Although I am, relatively speaking, an amateur in the field, I thought perhaps it might be of interest to review briefly with you the entire subject of diaphragmatic hernia and associated conditions as seen by the roentgenologist. All of the cases which I will show you have been seen at the Truesdale Hospital within the last three years and a number of them have already been reported by Dr. Truesdale.[1]

Without attempting to go into the literature on the subject of diaphragmatic hernia it is of interest to note that in 1912 only 15 of the 650 cases collected by Giffin[2] had been diagnosed during life. Even as late as 1923 Pancoast and Boles[3] were able to find only 47 cases so diagnosed. Unfortunately the large number of papers which have appeared during recent years has not served definitely to clarify the problem. The most recent case seen in our hospital was examined by numerous physicians in several of the more prominent medical centers in this country, and the diagnosis was missed in spite of a clear-cut history of adequate trauma and in spite of a flat film of the chest showing a large gas bubble just above the left diaphragm. The diagnosis in the case of this woman was finally made by Dr. Walter Jones of Providence and was confirmed by x-ray examination by Dr. James T. Boyd.

The study of the problem of diaphragmatic hernia and the recognition of the fact that it is not a rare condition have brought it to the attention of all who are concerned with the

*Read at the Annual Meeting of the Massachusetts Medical Society, Section of Surgery, Springfield, June 9, 1936.
This paper is a synopsis of a more complete discussion of the subject which will appear in an early issue of *The American Journal of Roentgenology and Radium Therapy* under the title, "Diaphragmatic Hernia and Associated Conditions."

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disorders of the gastrointestinal and respiratory systems. Both the internist and the surgeon have come to include it in their differential diagnoses, but the roentgenologist is the one on whom the major portion of the responsibility rests in establishing the diagnosis in most cases. It is quite proper, therefore, that the roentgenologist should have a very keen interest in the problem. If his examination is made with care and with a knowledge of the various types of hernia which may occur, his opinion may be of invaluable assistance in directing the proper course of treatment for the patient.

The muscular portion of the diaphragm is divided into three main parts and each part is named according to its site of origin. The pars sternalis arises from the posterior surface of the xiphoid process, the pars costalis from the costal cartilages of the six lower ribs and the pars lumbalis from the medial and lateral lumbocostal arches. The foramen of Bochdalek is the opening which is found posterolaterally if there is failure of fusion of the pars costalis and the pars lumbalis. Similarly the foramen of Morgagni is found anteriorly when there is failure of fusion of the pars costalis with the pars sternalis.

It should be noted that there is no sharp line of demarcation between the normal and the abnormal as regards the fusion or failure of fusion of these several segments of the muscular portion of the diaphragm. Even in the normal adult there is often a triangular space which separates the muscle fibers of the posterior and lateral segments. This space is filled by a thin layer of connective tissue which is covered above and below by pleura and peritoneum, respectively. This layer of connective tissue is much less elastic, and hence more easily torn, than the surrounding muscle, and that it is not more frequently the site of hernia is probably due to the fact that the area is protected by the liver and by the fatty tissues surrounding the adrenal gland and the upper pole of the kidney. That the protection offered by the liver is a very real thing is shown by the fact that, even in traumatic cases, 95 per cent occur on the left side.

THORACIC STOMACH

There are only four cases in the literature which definitely belong in the group of true thoracic stomachs and which have all of the findings described by Bailey[4] when he gave the name. It is unfortunate that the literature contains many reports of so-called "thoracic stomach" that upon closer examination prove to be nothing more than the very common type of hiatus hernia in which a relatively large portion of the stomach has been found above the diaphragm. The true thoracic stomach is an anatomic variant which cannot be corrected by any surgical procedure, whereas the hiatus hernia is an acquired lesion which may be repaired if the symptoms warrant.

DIAPHRAGMATIC HERNIA WITH SHORT ESOPHAGUS

The group included under the title of diaphragmatic hernia with short esophagus is of considerable interest although it has been well recognized for only about 5 or 6 years. It is important that this group should be recognized and clearly defined, since the shortened esophagus prevents surgical repair of the hernia. The preoperative differentiation of this group and the much larger group of hiatus hernias can be made only by the roentgenologist or the endoscopist, and it is, therefore, of particular importance that the roentgenologist should make a careful study of the esophagus in all cases of hernia through the diaphragm.

In the patient having a diaphragmatic hernia with a short esophagus, the esophagus passes downward through the posterior mediastinum in an almost straight line and enters the displaced stomach in its uppermost part. Instead of the usual rounded fundus the upper end of the stomach, in these cases, is frequently more or less conical or may have the appearance of a dilated portion of the esophagus. In the hiatus hernia, on the other hand, the termination of the esophagus is frequently above the diaphragm, but a careful study will show that this high point of termination is due to tortuosity and not to shortening. It will also be noted that, in cases of hiatus hernia, the fundus of the stomach has the same smoothly rounded contour as that normally seen below the diaphragm and, further, that the point of entrance of the esophagus into the stomach is slightly to one side rather than at the apex.

If the esophagus is short, the stomach must of necessity remain at least in part within the chest at all times. Hence, in cases of this type, the displacement of the stomach should be visualized even when the patient stands erect, although it may not be possible to fill completely the intrathoracic portion of the stomach in this position. Careful observation of the first few swallows of barium will, in many cases, serve to differentiate this condition and hiatus hernia, since in the latter condition the hernia is frequently present only when the patient is in the horizontal or Trendelenburg position. Hiatus hernias may be visualized in the erect position only if they are large or are adherent to the surrounding structures.

It is of interest that in all of the reported cases of hernia with a short esophagus the junction of the esophagus with the stomach is at the level of the seventh or eighth thoracic vertebra. It is not yet clear why the short esophagus should be so nearly the same length in all

of these cases, but it is an added reason why this group should be separated from the much smaller number of cases included under the title of "thoracic stomach".

Most authors are agreed that surgery is of little or no benefit in these cases, although Harrington[5] in 1933 reported four cases in which he sutured the diaphragm above the stomach following phrenicotomy. Other surgeons who have attempted to operate on this condition have found that the esophagus could be stretched sufficiently to bring the stomach down below the diaphragm but that it could not be held in that position.

HIATUS HERNIA

The hiatus hernia is by all odds the most common type of hernia through the diaphragm and is usually found in women over forty years of age who are overweight. Of the seventeen cases in this series all but two were women. The youngest was 38 years of age and the average age of the group was 51 years.

Hiatus hernias are true hernias in the sense that they are invested by a serous sac. They are also true hernias in the sense that the stomach was once in its normal position below the diaphragm. In this latter regard the two previous groups of cases are not true hernias. The esophagus is of normal length but its point of entrance into the stomach may be above the diaphragm due to tortuosity, as mentioned above.

It must be remembered that in most cases of the hiatus type the hernia is not present when the patient is in the erect position. It is usually best seen and most nearly filled in the supine or Trendelenburg position and with the right chest slightly forward. If the hernia is present in the erect position it is indicative of adhesions. In the present series of seventeen cases the hernia was visualized as a gas bubble above the diaphragm in four cases even before barium was given.

CONGENITAL HERNIA

Congenital hernias are, in many respects, the most interesting of all the diaphragmatic hernias. It is in this group that we find the greatest departure from the normal as well as variation in the organs involved and variation in the site of herniation. They are often dramatic in their clinical course and they are frequently the cause of death by asphyxia or intestinal obstruction. Their symptomatology is often related more closely to the respiratory system than to the alimentary tract by reason of the displacement of the mediastinum and compression of the lung.

The great majority are found on the left side and occur through a persistent foramen of Bochdalek. Less commonly they occur through the parasternal foramen of Morgagni and still less commonly through defects in other parts of the diaphragm. A few have been reported in which the hernia occurred on the right side and included only a portion of the liver.

The common type occurring through the left foramen of Bochdalek frequently includes both the large and small intestines, the stomach, spleen, omentum, left lobe of the liver and, occasionally, other organs. Those occurring anteriorly usually involve only the large and small bowel and the omentum.

Due to the fact that the entire left chest may be filled with abdominal organs and to the fact that loops of bowel may be seen entering and leaving the chest over a rather wide area, the roentgenologist may be led to wonder whether sufficient diaphragm remains for satisfactory repair or whether the case may be one of congenital absence of the diaphragm. Careful studies in all positions at frequent intervals after the ingestion of barium and after barium by enema will usually give indirect evidence of a shelf-like structure pressing against some of the loops as they pass from one cavity into the other. In searching for evidence of such remnants of the diaphragm, it must be remembered that the diaphragm is frequently depressed by the herniated organs above it. Evidence of a sac, if present, may be shown by a thin line of slightly increased density which appears to gather the loops of bowel together into a space somewhat smaller than the thoracic cage.

TRAUMATIC HERNIA

Traumatic hernias may occur in children or adults and are always false hernias. Interesting statistics regarding the incidence of traumatic hernia have been collected by Hedblom.[6] He found that approximately 90 per cent occurred in males and that about 50 per cent were due to penetrating injuries. Of those due to nonpenetrating injuries only 23 per cent were due to crushing while 36 per cent were due to falls. The possibility of hernia should, therefore, be carefully considered in the examination of all persons who have suffered severe injury due to falling.

Traumatic hernia may occur through any part of the diaphragm but 95 per cent are found on the left side. The tear in the diaphragm usually runs radially from the central tendon and frequently extends from the dome to the periphery. The tendency of the opening to extend the full length of the muscle fibers makes it similar to that of congenital origin, and the number and variety of the organs involved are also frequently similar. A point of difference between the extensive traumatic hernias and the congenital hernias is that in the traumatic group the cecum is fixed in its

normal position in the right lower quadrant, whereas in those of congenital origin there is frequently an associated incomplete rotation of the colon so that the cecum and appendix are found in the left chest.

EVENTRATION OF THE DIAPHRAGM

Eventration of the diaphragm may be congenital or acquired and is the result of aplasia or atrophy of the muscle fibers. It is a relatively rare condition if we exclude all cases due to operations on the phrenic nerves. It is more common on the left side than on the right and is also more common in males than in females The diagnosis is of course dependent upon the demonstration of an elevated, but intact, diaphragm. Motion of the elevated diaphragm may be normal, diminished, absent or reversed. The differential diagnosis of eventration and hernia may be extremely difficult,. but time does not permit a discussion of those difficulties here.

CONGENITAL ABSENCE OF THE DIAPHRAGM

Congenital absence of the diaphragm must always be included in the differential diagnosis of diaphragmatic hernia, although it is an extremely rare condition. There are only twelve cases reported in the literature and several of these are not definitely proved. It must be remembered that even so marked an anomaly as this is not incompatible with life and it should be borne in mind that the mammals are the only members of the animal kingdom which possess a diaphragm.

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DISCUSSION

CHAIRMAN HAYDEN: This paper will be discussed by Dr. Philemon E. Truesdale of Fall River.

DR. PHILEMON E. TRUESDALE, Fall River: *Members of the Section*—The paper which Dr. Marks has just read shows exceptionally fine work and an exceedingly good grasp of the entire subject of diaphragmatic hernia from his roentgenologic studies. In these cases the roentgenologist actually holds the key to the chamber of hope. Nothing can be done for the condition until a diagnosis has been established. Dr. Marks has concentrated on detail and, in this way, has furnished an inspiration to all the members of the staff, has their co-operative interest and has prompted further effort.

It is surprising to note how many branches of medical practice are involved in the care of patients with diaphragmatic hernia.

First, the embryologist is needed because of the genesis of diaphragmatic hernia. Shifting of organs during the developmental period furnishes embryologic data toward solving such problems as short esophagus and thoracic stomach. Dr. Bremer has said that embryology of the diaphragm is not well understood, at least not satisfactorily described in any book on the subject.

The anatomist helps determine the origin and distribution of the muscle fibers and the relation of the dome of the diaphragm to the ribs and other structures.

The physiologist makes clear the processes that occur as a result of altered digestion, circulation and respiration. We still have much to learn regarding the function of the esophagus, the cardia and the pillars of the diaphragm in the act of deglutition. We should like to know why a bolus of food swallowed is retarded slightly at the lower end of the esophagus before entering the stomach. The Germans call this point the loitering canal. The presence of a cardiac sphincter and of an esophageal-diaphragmatic membrane are still moot questions.

The climatologist is needed to aid in differentiating cases of diaphragmatic hernia and those of tuberculosis, so that diaphragmatic hernia will be discovered before patients are sent to sanitaria for the treatment of pulmonary tuberculosis.

The cardiologist is needed to study symptoms of diaphragmatic hernia simulating heart disease. Cardiac symptoms are often present, especially in cases of the esophageal hiatus type. The greater the amount of gas in a hollow viscus above the diaphragm, the greater the mechanical pressure upon the heart. The symptoms from this encroachment on the heart may simulate angina pectoris.

Diaphragmatic hernia may complicate pregnancy. Rigler and Eneboe demonstrated hiatus hernia in 18 per cent of pregnant women during the third trimester, due to increased abdominal pressure.

The pediatrician usually discovers the congenital form of diaphragmatic hernia. He must be able to recognize the condition and determine the method of treatment. The first patient who came to me in 1921 had previously been examined by many clinicians. The correct diagnosis was not established until a pediatrician, Dr. Henry I. Bowditch, diagnosed the condition on clinical examination.

The gastroenterologist is often consulted for stomach and intestinal irregularities.

The esophagoscopist may be instrumental in discovering the variations at the cardia.

Successful outcome in operative cases is attributable partly to the anesthetist. In my own series of operative cases, I would like to say with reservation that the anesthetist usually carries the patient through the danger period.

Finally, the surgeon is called upon in the discussion of treatment to be adopted.

Thus many special services are brought to bear upon the study and treatment of diaphragmatic hernia. The subject has opened many new fields for investigation.

I think that this paper by Dr. Marks demonstrates many points at issue. Scarcely two cases are alike and authorities such as von Bergmann, Knothe and Sauerbruch all hold different views; nevertheless, some of the associated problems have been solved while many others remain to be explained.

DR. SAMUEL MOREIN, Providence, R. I.: I am very glad to have been able to hear this comprehensive paper of Dr. Marks' and the discussion by Dr. Truesdale.

The subject of diaphragmatic hernia has been very

comprehensively described first by the roentgenologist, and of course, by the work of the surgeon, and most of the literature has been contributed by these two. The medical man has been rather slow in taking part in the subject although he usually sees these cases first. As Dr. Truesdale has pointed out, many branches of medicine come in contact with the handling of these cases, but I feel that Dr. Truesdale has omitted one branch of medicine, hematology. In many of these cases, the presence of an unexplained secondary anemia may be the only symptom to attract the attention of the clinician. The anemia in these cases is due to mild but frequent hemorrhage from erosions of the esophageal or gastric mucous membrane, caused by mechanical injury to the stomach because of its unnatural situation or by some interference with its blood supply caused by the stricture at the esophageal orifice, especially during attacks of vomiting or severe coughing. These erosions sometimes progress to actual ulcerations and occasionally to carcinoma.

The cases of diaphragmatic hernia in which I am particularly interested as a gastro-enterologist are of the esophageal orifice type which often present a complex symptomatology and are the most commonly seen. Coming from a neighboring city of Dr. Truesdale, I have been doubly interested in this subject, and during a period of 12 years I have encountered 55 cases of this type of hernia. An incidence of 1 to 113 cases observed. I have a few slides I would like to show you of some of the cases I have handled, which will bring out some interesting points.

(Slide) This is an esophageal-diaphragmatic hernia with herniation of about one-third of the stomach through the esophageal orifice, encroaching on the lower portion of the esophagus and displacing the heart to the right. Previous diagnosis of gallbladder and heart disease, and esophageal carcinoma had been made.

(Slide) This is a diaphragmatic hernia, paraesophageal type, with herniation of about one-third of the stomach through the esophageal hiatus. With the patient lying down on the left side, the hernia is seen in the posterior mediastinum encroaching on the heart. Previous diagnosis of heart disease had been made in this case.

(Slide) This is a diaphragmatic hernia and cancer of the fundus of the stomach, with herniation of about one-third of the stomach through the esophageal hiatus, associated with intermittent attacks of intestinal obstruction, hematemesis, and marked anemia. Previous diagnosis of pernicious anemia and carcinoma of the colon had been made.

(Slide) This is a diaphragmatic hernia and carcinoma of the cardia, originating at the site of an ulcer within the herniated portion of the stomach. This case has been observed over a period of four years.

CHAIRMAN HAYDEN: Dr. Marks, will you close the discussion?

DR. MARKS: I have nothing further to add.

(Section adjourned.)

UNDULANT FEVER*

An Usual Case With Necropsy

BY JACQUES S. GOTTLIEB, M.D.†

WITH the recognition by Bruce in 1887[1] of the specific organism, undulant or Malta fever became recognized as a distinct disease entity. Clinically, however, this disease had been described under a variety of names throughout Europe, Africa and Asia, even dating back to the epidemics of Hippocrates. The most common name was that of Malta fever, a result of study at one of the most highly infected areas. It was not until 1913 that the International Congress of Medicine agreed that the term *undulant fever*, because of the nature of the temperature curve, was the most satisfactory.

Interest in this disease in the United States was not aroused until cases of infection occurred among our soldiers after the Spanish-American War. Slowly throughout the following years more and more cases have been recognized until at present practically every state has its reported cases, and thus the disease assumes an endemic character. Because of this great potential danger, no other infection has attracted wider interest from the bacteriologist and public health worker.

Because of the heterogeny of the symptom complexes, the clinico-pathologic laboratory is of great assistance and is usually relied upon in establishing the diagnosis. The cultivation of one of the brucella group of organisms from the blood or urine and the blood agglutination and intradermal tests are the tests usually performed.

The following case, although conforming to the general symptomatology of the disease, illustrates that laboratory tests cannot be wholly relied upon for diagnosis but are useful only as adjuncts to the clinical picture. In addition, the postmortem examination revealed some rather unusual findings.

A. N., a twenty-nine year old married man, weighing 198 pounds and measuring six feet tall, entered the Hahnemann Hospital, Worcester, on September 13, 1935, with the chief complaint of fever of about three weeks' duration.

The present illness began with severe, diffuse, colicky pains in the upper abdomen three weeks before admission. He was slightly nauseated at that time. The physician who was called administered an opiate which relieved him temporarily. The following day he had a severe chill and his temperature was elevated to 105° F. He was then admitted to a nearby hospital where he remained for about one week. While there two Widal tests were negative, as were the bacteriologic examina-

*Awarded the $50.00 prize of the Massachusetts Medical Society, being the best case report submitted by an intern in one of the Massachusetts hospitals offering a rotating intern service.

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tions of the urine and feces for the typhoid organism.

During this intervening period he had a daily irregular temperature preceded by a chill, following which he would perspire quite profusely. Occasionally he had dull pains in his upper abdomen. Gaseous eructations and an unpleasant taste in his mouth were almost constantly present. He was bothered by constipation. He had been drinking unpasteurized milk from a dairy which undoubtedly was contaminated with *Brucella abortus*, for the Massachusetts Department of Public Health authorities traced several other cases to the same source.

The past history was of some interest for he had had attacks of colicky pain in his upper abdomen which would last for three to four hours and would be followed by a dull ache. Occasionally he would vomit during one of these attacks. They occurred at irregular and infrequent intervals during the past four years. Other than that, the patient was a very well developed, husky male who had never had any serious ailments. There was no history of any unusual activities during the months preceding his illness.

The family history was irrelevant. His parents and wife were living and in good health. No one with whom he was acquainted had any similar sickness.

The physical examination was conspicuous by the paucity of positive findings. On admission he did not appear to be particularly sick or in discomfort, although he was pale and appeared slightly anemic. There was no injection of the pharynx. The heart was not enlarged and the sounds were of good quality. The blood pressure was 118/72. The lungs were clear. The abdomen could not be adequately examined for he was extremely sensitive to touch.

The routine laboratory work on admission showed an essentially normal urine, except for an occasional granular or hyaline cast. The blood count showed a red blood cell count of 4,210,000 and a white blood cell count of 17,600 of which 89 per cent were polymorphonuclear leucocytes. During his stay special laboratory work was done for diagnosis which, however, was very disappointing. Several blood agglutination tests for organisms of the brucella group were done—the first soon after admission which was positive in a titre of 1:10, and the second about six weeks later which was positive in dilution of 1:45 and negative in 1:135. Blood cultures for the brucella organism were repeatedly unsuccessful. No allergic intradermal test was done because at that time we lacked suitable antigen. Other specific examinations, as Widal tests, sputum examinations for tuberculosis and blood smears for malaria, were repeatedly negative.

Blood counts and urine examinations were done at frequent intervals. On October 4, the red blood cell count had fallen to 2,930,000, a fairly severe anemia. On iron and liver therapy the count increased to 3,510,000 by October 25, three weeks later. However, in spite of continued large doses of iron and parenteral liver injections, the red blood cell count gradually fell until it reached its low of 2,480,000 on December 13. At only one time was the white blood cell count below 10,000. On December 2 that count was 8,100 of which 5 per cent were polymorphonuclear leucocytes, the remainder being lymphocytes.

Toward the end of November, bile began appearing in the urine and on December 2 the blood icteric index was 35.

During the patient's stay in the hospital his clinical course was progressively downward. He remained 105 days before expiring on December 27, 1935—this made a total of 126 days for his illness. Entering as a large, well-developed man weighing about 200 pounds, not feeling particularly ill in spite of his high temperature, but worried, he gradually changed, slowly losing weight until he became quite thin—this in spite of a high caloric diet—his hair greyed and his cheeks became sunken.

His temperature was extremely erratic, ranging from 99° to 106° F. The fluctuations were quite irregular. During the second, third and fourth weeks he had numerous, severe chills lasting for about twenty minutes and followed by profuse perspiration. These chills varied in their frequency occurring as often as four a day, then lapsing two or three days before another would occur. On the whole the temperature averaged between 102° and 103° F. After October 13, for the remaining ten weeks, no chills occurred. At no time was there a steady undulatory swing to the temperature.

The pulse varied from around 90 to 140, averaging about 110 per minute. Respirations were as rapid as 40 per minute, but were usually within normal limits.

Early in his illness in the hospital he had several severe nosebleeds. In October, after developing a hacking cough, he produced some bloody sputum. At no time, however, could any abnormalities be heard in his chest. During the first week of October he developed paresthesia of the right hand which soon led to definite muscle weakness in the flexors and a demonstrable hypesthesia of the glove type. Atrophy of the flexors and intrinsic muscles of the hand—a peripheral neuritis—resulted in about a month.

Throughout his course in the hospital he had difficulty in sleeping and frequently had to have sedatives. Ofttimes he was confused and irrational at night. In October an abscess formed over the sacrum which was followed by a pressure necrosis. The area involved was about 6 cm. in diameter. This was slow to detach and was cut away on December 2. The wound was clean at the time of his death.

Beginning in December he developed edema of his feet and ankles which increased until the sacral area was involved. About the same time he developed a severe jaundice. This, however, seemed to respond favorably to 1000 cc. of intravenous 5 per cent glucose daily.

The treatment was mainly supportive as would be given to any chronic illness.

He received in addition a complete course of Brucella Abortus and Melitensis Vaccine and Parke, Davis & Co. arsphenamine to a total of 2.5 gm.

Because of his anemia which was progressively becoming worse and as a therapeutic attempt, a transfusion of 250 cc. of whole blood was given to him on December 15 from a donor who had recovered from undulant fever in August. On December 22 he was given 200 cc. of whole blood and 300 cc. of citrated blood. He seemed to be slightly better symptomatically after the transfusions, but he died suddenly in what appeared to be complete heart failure when an attempt was made to move him on December 27.

The autopsy findings were most interesting. On opening the abdomen about 20 liters of a thin, cloudy, serous fluid were found. A sample of this fluid was sent for an agglutination test for undulant fever. It was reported positive in a dilution of 1:15, but negative in 1:45. On stripping the abdominal wall away from the right chest there was found an abscess lying between the peritoneum, the skeletal musculature and the falciform

ligament of the liver. This abscess contained approximately 5 cc. of a thick, pale greenish-grey fluid. This abscess furrowed along the subdiaphragmatic space, forming several small, subdiaphragmatic abscesses. There was also a tract leading to the inferior surface of the liver around the gallbladder where there was a walled-off abscess containing approximately 50 cc. of a thick, purulent exudate. There were multiple, small abscesses caught in between loops of small intestine and folds of the mesentery.

On sectioning the liver, which was somewhat enlarged, approximately one-half of the organ was made up of various sized abscesses filled with a similar exudate but somewhat bile-stained. In addition, there was found an acute toxic splenitis and mesenteric lymphadenitis.

A heart's blood culture was taken which showed, after an interval of time, gram-negative micrococcus-like bacilli. These were identified by cultural characteristics as *Brucella abortus*.

This proved case of undulant fever is of particular interest for, although conforming in the main to the general symptomatology of the disease, there were several striking deviations which can be briefly emphasized.

In the first place, this case showed quite definitely that the intermittent or undulatory type of temperature, after which the disease in fact is named, does not always occur. Likewise, a leucopenia with a relative lymphocytosis need not always be present. It is only of diagnostic significance when seen, for a leucocytosis does not by any means rule out undulant fever.

Of more importance as laboratory aids are the specific agglutination, complement-fixation and intradermal tests. M'Fadyean and Stockman,[2] Larson[3] and Huddleson,[4] who have exhaustively studied the serologic tests, all conclude that the complement-fixation test does not furnish so much information as the agglutination test. Besides it occupies more time and attention, and has thus fallen into disuse. The agglutination test which can be quickly and easily performed gives titres above 1:80 in the majority of positive cases. It is not unusual for a case of undulant fever to have a low titre early in the course of the disease; often it takes several weeks for the agglutinins to demonstrate a definite increase. It is, however, unusual for a case to persist as long as this one did without showing any more definite increase in titre than from 1:10 to 1:45 during a six weeks' interval and not increasing thereafter. The intradermal test would seem to be a satisfactory one providing a suitable antigen is obtainable. A positive test would indicate, just as does the tuberculin test, not only those who are actively infected but also those who have been infected previously with the brucella organism.

The failure to obtain a positive blood culture during life was disappointing, but emphasizes that difficulty. Different varieties of the organism require different culture mediums, are slow to grow, while some are aerobic and others anaerobic. In fact, some strains of the abortus variety even require a carbon-dioxide atmospheric content of 10 per cent for growth. The fact that a growth was obtained at autopsy was indeed gratifying, for it definitely proved the infection in spite of the disappointing findings of the specific tests.

Although the blood has been the most common source and gives the highest percentage of cultures from infected individuals, the urine and feces are also contaminated. Shaw[5] has been able to find the organism in the urine in about 50 per cent of his cases. Moreover, the organism can be found there for a long time—up to two years after convalescing. Amoss and Poston[6] have succeeded in isolating the organism from the feces. These facts definitely indicate that the urine and feces should be carefully disinfected to prevent spread. For, although it is uncommon, cases have been reported where the mode of infection was through cuts and abrasions of the skin. This, of course, is of importance from the viewpoint of care of the patient in the hospital.

Pathologically, the subdiaphragmatic and hepatic abscesses found in this case are exceedingly rare. Eyre and Fawcett[7] have reported the only comparable case. In retrospect, it would thus seem that these lesions were probably responsible for the colicky abdominal pains, the period of rather intense jaundice and, possibly, the leucocytosis.

The remaining pathologic lesions, such as the acute toxic splenitis and mesenteric lymphadenitis, are the usual postmortem findings in this disease.

This case, therefore, serves as an illustration of a disease with heterogeneous symptom complexes, which are ofttimes quite resistant to therapy particularly as we lack any specific remedy. Moreover, as has been indicated, the laboratory tests cannot be wholly relied upon for diagnosis but are useful only as adjunets to the clinical picture.

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Case from service of E. A. Fisher, M.D. Pathology through courtesy of William Freeman, M.D.

CASE RECORDS
of the
MASSACHUSETTS GENERAL HOSPITAL

ANTE MORTEM AND POST MORTEM RECORDS AS USED IN WEEKLY CLINICAL-PATHOLOGIC EXERCISES

FOUNDED BY RICHARD C. CABOT, M.D.

TRACY B. MALLORY, M.D., *Editor*

CASE 22431

PRESENTATION OF CASE

A 46 year old Italian tailor was admitted complaining of abdominal pain.

The patient had been slightly costive for about a year and a half, and as a result took a laxative once a week. Two days before entry he took a dose of Epsom salts which resulted in six loose, rather violent bowel movements. This produced some weakness but he felt well otherwise until the following day when he became aware of the gradual onset of cramp-like colicky pains in his lower abdomen, more marked on the left side, and often sufficiently severe to cause him to double up. A physician was called who gave him a hypodermic injection which produced some relief. He vomited once at the onset but not thereafter. The vomitus consisted of thin watery fluid. There was no distention and no further bowel movements followed those noted above. There was no history of weight loss, tarry stools, or recent change in bowel habit.

The patient had had a gunshot wound in the left flank during the World War. An epidermoid carcinoma of the tongue was treated by radium implantation a year and a half before entry.

Physical examination showed a well-developed and nourished man in no acute discomfort. He coughed occasionally during the examination. There was slight scarring of the left border of the tongue. One small hard gland was palpated in the submaxillary region. At the left lung base there was dulness to percussion and absent tactile fremitus. Breath sounds were also absent. The dulness extended upward anteriorly to the sixth rib and posteriorly to the seventh. The abdomen was slightly distended. Intermittent, roaring peristalsis was audible, often without the stethoscope.

The temperature was 98°, the pulse 90. The respirations were 20.

Examination of the urine was negative. The blood showed a red cell count of 5,050,000, with a hemoglobin of 80 per cent. The white cell count was 11,650, 86 per cent polymorphonuclears.

A barium enema passed to the splenic flexure where it met a complete obstruction. The bowel proximal to this point was filled with gas and fecal material. Detail examination showed a smooth narrowing of the bowel extending into the pathologic region and the converging mucosal folds appeared to be normal. The diaphragm on the left side was high and limited in excursion. The costophrenic angle was obliterated by what appeared to be a thickened pleura or a very small amount of fluid. An x-ray examination of the chest two days later showed dulness obliterating the lower half of the left chest with a hazy curved upper border. The mediastinum was shifted slightly to the right and the left diaphragm was still said to be high.

He developed hiccough but otherwise his condition remained unchanged. On the fourth hospital day a laparotomy was performed.

NOTES ON THE HISTORY

DR. J. H. MEANS: It says in the last line of the record "there was no history of recent change of bowel habit", but the first line would seem to contradict that because it says that he had been slightly costive for a year and a half and he had had extraordinary changes in bowel habit during the last few days. I do not know whether that slight costiveness over a year and a half is significant, but I do think it is wise in the practice of medicine to look upon any change in bowel habit in a middle-aged person as requiring investigation. Two days before entry we note that having taken a mild laxative he decided to do better than that and took a dose of Epsom salts that produced these violent movements. Whether that is of any etiologic significance is not clear at the moment. It may be. We will note it as an interesting event at any rate.

Next apparently he developed rather gradual cramp-like colicky pains in the abdomen, more on the left side. That is a very impressive symptom, it seems to me, and when we are told it caused him to double up and the physician gave him a hypodermic we are justified in thinking he had very severe abdominal pain. It is significant that he vomited thin watery fluid only once. Following this he had absolute obstipation until the time the history was taken.

The history is very suggestive of an acute obstruction in the alimentary canal, one would say in the colon, because of the lack of any statement about toxic manifestations which one would expect in a higher obstruction, and also because of the fact that there was vomiting on only one occasion. The cramp-like colicky pains combined with obstipation certainly would be consistent with an obstruction in the colon, so that on the history we can say that this man has an acute colonic obstruction apparently com-

ing on after taking Epsom salts and preceded by a year and a half of slight constipation.

"The patient had had a gunshot wound in the left flank during the World War." Whether that has any bearing we will consider later. It is a fact which may be of etiologic significance. He also had had an epidermoid carcinoma of the tongue. Thus in the past history we have two factors which may be of etiologic significance, one mechanical, the other malignant.

In the physical examination we have some evidence that confirms the impression of colonic obstruction. This roaring peristalsis would certainly be consistent with the story, but also we have some extraordinary new evidence which apparently had given rise to little or no symptomatology; namely, some chest signs. As I interpret these signs they are classical either of a fluid at the left base or possibly of a solid lesion of the left base, such as a new growth or some other kind of consolidation of the lung with a plug in the bronchus. I do not see how these signs can be interpreted on any other basis than that, or rather I do see how they could but I will come to that later.

It is of interest that he had no fever. His pulse was 90 and the respirations were 20. In other words, his chart was essentially negative. The urine was negative. He had no anemia. He had a slight leukocytosis, so that really the clinical pathology was essentially negative. I do not attach any great significance to 11,000 white cells with an abdominal situation of this kind.

Then the radiologist came along and did his bit. He made two examinations two days apart. A whole lot happened in the patient's chest between these. So far as I can make out there is nothing much to be seen in the first picture beyond a high left diaphragm with an air bubble below it. In the second picture there is what appears to be a left pleural effusion with displacement of the heart to the right. A fluid level, low in the left chest, appeared in the dull area. I should like very much to know whether it is above or below the diaphragm. Probably the radiologist will be able to tell us. If it is above the diaphragm, there must be either an abscess cavity or empyema communicating with a bronchus, unless perchance a hollow abdominal viscus has entered the chest through a hernia. The absence of productive cough in the history is against abscess or empyema communicating with a bronchus.

Before calling on the radiologist we may summarize what we have up to this point. There seems to be definite evidence of acute, rather low intestinal obstruction, evidence of rapidly developing pleural effusion and some suggestion of a hollow viscus in the thorax. Let us now ask for the radiologist's opinion.

DR. RICHARD SCHATZKI: The examination of the colon showed that the barium came to an abrupt stop at the splenic flexure, though spot films showed normal rugae in the region of the obstruction. The narrowing was therefore interpreted as due to pressure from outside. There was an air bubble above this region. In the anteroposterior view the air bubble lay below what appeared to be the left leaf of the diaphragm, but one must remember that the diaphragm has two leaves.

DIFFERENTIAL DIAGNOSIS

DR. MEANS: Our problem is how to explain this rapidly developing pleural effusion and the fairly rapidly developing colonic obstruction. I suppose that either of these affairs could be due to malignancy, to infection, or to some purely mechanical cause.

In regard to the hints in the history—there is a gunshot wound that he sustained in the war. One wonders whether his diaphragm could have been injured and whether he might have sustained a lesion there that either produced a diaphragmatic abscess which did not interfere with bowel function but made a weak place that later on gave way under some strain. One is impressed with the fact that all of these events came on after the taking of Epsom salts, and after rather violent bowel movements. It is conceivable that that trauma to his bowel did something to an existing diaphragmatic hernia which I think would pretty well account for the whole picture. Of course I have been very conscious of diaphragmatic hernia since I came to grief in Hartford on a case that Dr. Stoll presented here later, a patient with a hydrothorax which turned out to be a stomach in the chest half full of water. However, in that case there was a good fluid level across the middle of the thorax. In this case there is a fluid level but it is underneath the effusion and we do not know where it is, which makes it difficult. One can get a rapidly developing effusion into the chest on a purely irritative basis. I have seen it occasionally. There is possibly something going on beneath the diaphragm that has started up an irritant which has given rise to an effusion in the thorax.

We also have to think of the kinds of fluid that might be present in the chest. Could this be a hemothorax? I do not see how he could have filled his chest with blood without other manifestations of hemorrhage that they would tell us about. I cannot conceive of this filling up with pus so rapidly as that. I do not think it is only fluid in a hollow viscus because there is no fluid level. It is a good thing to realize that among the kinds of fluid that might be in the chest is stomach contents inside of the stomach. Let us leave the chest for the moment.

What causes might there be for an acute obstruction in the colon? There is this matter of

carcinoma of the tongue. I know very little about carcinoma of the tongue so I looked it up in Ewing's and it says, "metastases from tongue cancers in the esophagus are rare but have been observed in the liver, heart, adrenal and mesentery". Extension to the lungs and pleura are even rarer. Altogether it seems to me very unlikely on the doctrine of chances that this carcinoma had anything to do with the present situation. However, he might have a new cancer. We know that a person with one cancer may have another. The patient is a person who has had a previous carcinoma and may have a new one, but I doubt if his present lesion is metastatic from the tongue.

As to malignant disease, we might have a cancer of the colon itself. There was no evidence in the x-ray to suggest that such a lesion was present. We might have a malignant process outside of the bowel making pressure upon it at that point. It might involve the diaphragm and in that way be responsible for this irritative pleural effusion. I am not very pleased with such an interpretation, however, as it seems to me rather strange; but it is a possibility.

I cannot see any reason to suppose he has a subdiaphragmatic abscess that could give rise to an irritative effusion in the thorax because there is no evidence of infection, no fever and almost negligible leukocytosis, and no history of symptoms suggesting infection in any way.

I cannot make a diagnosis beyond colonic obstruction and pleural effusion. I believe that they are due to one cause. What that could be I do not know but I rather think that diaphragmatic hernia with something going on in the herniated viscus is the most plausible interpretation. I would put some form of malignancy either in the bowel or more likely outside of the bowel, making pressure upon it, as a second choice.

Preoperative Diagnosis

Splenic flexure obstruction, carcinomatous.

Dr. J. H. Means's Diagnoses

Acute colonic obstruction.
Pleural effusion.
Diaphragmatic hernia?
Malignancy involving the colon?

Pathologic Diagnosis

Diaphragmatic hernia.

Pathologic Discussion

Dr. Tracy B. Mallory: One of the most successful plays in badminton, which is a game I play a great deal, is to put the bird twice to exactly the same spot and try to catch the man as he is pulling away from the area. I thought I might catch Dr. Means by that method on this case. The man did have a diaphragmatic hernia and Dr. Miller will tell us about it.

Dr. Richard Miller: I want to congratulate Dr. Means on an extraordinarily keen diagnosis. We did not think of diaphragmatic hernia. We thought it was some type of malignancy. On opening the abdomen it was obvious that there was some sort of mass adherent to the undersurface of the diaphragm on the left, and it became apparent that the colon, at the splenic flexure, and the omentum, which was thick, were adherent there. There was an opening in the diaphragm, elliptical in shape, and just about large enough to take two fingers. It was impossible to pull the abdominal viscera down, so we enlarged the opening to two inches long and pulled down a handful of purplish colored great omentum and a small loop of colon near the flexure. The omentum was probably viable but we were not sure, so we removed the involved portion. The colon was viable. Once these were pulled out one could see the collapsed left lower lobe of the lung. It was very easy to close the opening in the diaphragm, which was then done. The patient made an uneventful recovery and has gone home.

Dr. Means: What about the fluid in the chest? I meant to comment on the fact that they did not tap this chest fluid. They might have been prompted to be curious enough to tap prior to operation.

Dr. Mallory: As I recall he was tapped and they obtained a little fluid slightly tinged with blood.

Dr. Means: Did you find any great amount of free fluid at the time of operation.

Dr. Miller: Only a few cubic centimeters.

Dr. Means: The other question I would like to ask is about the gunshot wound. Do you think it was responsible?

Dr. Mallory: I do not know, but I am inclined to think so.

CASE 22432

Presentation of Case

A 75 year old American businessman was admitted complaining of abdominal distention.

For about thirty years the patient had been troubled frequently by indigestion, gaseous eructation, and constipation. Six years before admission he began to have attacks of distention, abdominal pain, and frequent small evacuations of clear colorless fluid within which there was no fecal material. The attacks would persist for several days and were usually relieved by colonic irrigation. Peristaltic waves were always visible but because of his thin abdominal wall this was considered to be of little significance. Five years before entry a rectal examination revealed the presence of what was thought to be a soft polypoid mass just barely

reached by the examining finger. Further rectal examinations, however, during the succeeding years were repeatedly negative. Proctoscopy likewise failed to demonstrate the mass and films of barium enemas showed only a large redundant colon although on one occasion an examination suggested a small polyp of the colon. This was never demonstrated in later films. Subsequently the patient continued to have attacks about four or five times a year but for the year and a half preceding entry he was free from symptoms and his bowel movements were unusually regular. Four days before admission the patient had constant and slowly increasing abdominal distention and visible peristalsis. Defecation ceased but there was passage of a large amount of clear watery material. There was slight rectal bleeding on the day before coming to the hospital and the patient had marked anorexia. There was, however, no nausea or vomiting and no note of pain.

About a month before this entry the patient entered the hospital because of hematuria and pain in the right costovertebral region. An intravenous pyelogram at that time showed delay in the appearance of the dye in the right kidney. The right pelvis was at no time well filled and the dye showed irregular distribution. The calices were dilated, blunted, and possessed irregular outlines. The left kidney and bladder were negative. Later films showed what presumably was a stone in the right ureter but attempted cystoscopic removal was unsuccessful. He remained in the hospital for a week and had no further urinary dysfunction.

Physical examination showed a thin, frail, elderly man. The skin and mucous membrane were pallid and the eyes exhibited a pronounced arcus senilis. The heart was normal and the lungs clear. The blood pressure was 118/75. The abdomen was distended and generally tympanitic. Peristalsis was both audible and visible but there were no palpable masses or tenderness. Rectal examination showed again the presence of a mass similar to that originally palpated but somewhat larger. It was said to be the size of two thumbs.

The temperature was 98°, the pulse 100. The respirations were 20.

Examination of the urine was negative. The blood showed a red cell count of 4,200,000, with a hemoglobin of 75 per cent. The white cell count was 8,000, 72 per cent polymorphonuclears.

A plain x-ray film of the abdomen showed a moderate quantity of gas in the colon and stomach. There was no definite evidence of intestinal obstruction.

Shortly after entry a laparotomy was performed.

Differential Diagnosis

Dr. Edward L. Young, Jr.: There are several things that come into our minds promptly on reading this history. First, the possibility, with indigestion over a long period of time, of whether there is biliary tract disease. Then the attack starting six years before entry suggests intermittent intestinal obstruction as a possibility, and at once you try to hitch up that possibility with a previous biliary tract disease, as could be done by assuming that a gallstone had ulcerated through into the small bowel and caused what gallstone ileus always does cause, intermittent attacks generally for a considerable period of time before the final complete obstruction.

The interesting thing about the recent attacks is the evacuation of clear colorless fluid. That is not of course characteristic of gallstone ileus and we tuck that away until we read the rectal examination which revealed what was thought to be a soft polypoid mass. An adenomatous polyp is a fairly common condition in the large bowel and it is perfectly possible for that to exist in the sigmoid and under certain conditions to prolapse so that, as here, it would be felt by one person who happened to examine the patient when he was on his feet and peristalsis had pushed it down, and then not to be felt again. That would fill the bill here, a prolapsing polyp with partial intussusception of a loose segment into itself with an excessive secretion of mucus below.

It is true of course that acute renal upsets can initiate a reflex of abdominal disturbances sufficiently severe to simulate an acute abdominal emergency. We have seen them not infrequently. They may simulate either an intra-abdominal inflammatory condition or an acute intestinal obstruction. However, this episode was a month before entry and there is no further note of trouble referable to the right kidney, so that I think we can throw it out of the picture.

The fact that the x-ray did not show this lesion does not mean it is not there. It takes very accurate technic with the enema and with the contrasting film with air after emptying to give any chance of showing small polyps and even then they may be missed. So that I think a positive digital examination here is what makes a diagnosis.

The patient had for three days the same clear fluid and then it became bloody. This is due to increasing intussusception and interference with the blood supply. Or it may suggest that this polyp has done what all large bowel polyps do eventually: changed from a simple adenoma to a malignancy.

The temperature, pulse and respiration would seem to me to rule out any intussusception of

importance, where the blood supply has been seriously interfered with, and that the blood is presumably coming from damaged tumor. I was interested in asking one of the younger men what he thought of the value of preoperative x-ray in this condition. He had seen a great many of the cases here in the last few years and he said, "I do not believe the x-ray gives us any help in these cases." The idea that a distended loop of small bowel is pathognomonic of intestinal obstruction did not seem significant to him. Here, it does not seem to be so. The clinical evidence is of acute intestinal obstruction. The fact that the patient did not vomit means two things, first that the blood supply has not been seriously interfered with, because this starts reflex vomiting, and secondly that it is low down, because we know that with purely mechanical obstruction low in the large bowel vomiting does not necessarily come on for several days after the obstruction has been complete. I should assume that the story here was that the prolapse of this polyp acted as an obturator presumably with intussusception of the bowel but without interference with the blood supply. The early suggestions of biliary tract disease can be eliminated, I believe, from consideration in view of the final story.

Preoperative Diagnoses

Polyp of the descending colon, ? carcinoma
Intussusception.

Dr. Edward L. Young's Diagnoses

Acute intestinal obstruction from intussusception of the sigmoid into itself due to a polyp of the sigmoid.
? of malignancy.

Pathologic Diagnosis

Papillary colloid adenocarcinoma of the colon with metastasis to one regional lymph node.

Pathologic Discussion

Dr. Tracy B. Mallory: This man was a patient of Dr. John Homans. I am sorry he is not here to tell us about the case himself. He made the first rectal examination and was perfectly certain at the time that he felt a polyp. He told the patient that it was potentially dangerous and should be operated upon without delay but the patient refused. At no succeeding examination for several years was he able to find it again, either with the finger or by proctoscopy and the x-ray report was somewhat equivocal. Then the final episode occurred and once again the tumor was obviously present low in the rectum. At this time the patient consented to operation and on exploration Dr. Homans found, as he confidently expected, an intussusception, evidently caused by the presence of this polypoid tumor. The tumor had in all probability been benign six years ago and in the interval had become definitely malignant. Microscopically it was a frank carcinoma and one of the half dozen lymph nodes sectioned showed metastasis.

A Physician: How high up was it?

Dr. Mallory: It was well up toward the upper end of the sigmoid and the intussusception was a relatively long one but readily reducible. Dr. Homans reduced it before resecting it.

Dr. Young: In other words there was no damage to the blood supply. I think the white count is important in that respect.

Dr. Mallory: The bleeding was from ulceration of the malignant mass itself.

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UNDULANT FEVER

IN a recent article by Hardy, Jordan and Borts the increase during the past ten years in the recognized cases of undulant fever throughout the United States is brought out and certain interesting and important epidemiologic aspects of the disease are clearly demonstrated.

Undulant fever may be caused by three different species of brucellae—*Brucella melitensis*, the caprine strain, *Brucella abortus*, the bovine strain and *Brucella suis*, the porcine strain. The first, the etiologic factor in Malta fever, is rarely isolated from cases of undulant fever in this country and, when found, is almost invariably from imported cases or laboratory infections. The etiologic importance of the other two strains is dependent on geographic location. Thus, in New York approximately 93 per cent of the classified strains are bovine, whereas in Iowa about 70 per cent of the strains are porcine. The hazard of exposure to porcine strains is far greater than that to bovine and the clinical reports of cases due to the former show that the disease is almost always more protracted and severe.

From 24 cases reported from five states in 1925, the number increased to 1,897 from forty-five states in 1935. In the latter year, 187 and 234 cases were reported from Iowa and New York, respectively. The average of the morbidity rates in Iowa, Missouri and Kansas is much higher than that in other parts of the country and is probably due to the high incidence of infection in the large number of hogs in this particular area. Statistics compiled by the U. S. Department of Agriculture indicate that the percentage of herds of cattle that are infected is remarkably constant throughout the United States and the low morbidity rates in certain states are undoubtedly the result of less accurate recognition and reporting of the cases.

The importance of the risks of occupation is clearly shown by a listing by occupation of the cases in Iowa. The morbidity rate for packing house employees is excessively high and that for men on the farm comparatively so. Nearly two-thirds of the cases are accounted for in men or women whose occupation is such as to bring them in contact with cattle, hogs or their products. The seasonal variation suggests that heavier exposures during and following calving and farrowing are, at least in part, responsible factors.

Undulant fever is not a common disease in Massachusetts, but a total of 42 cases was reported in 1935, giving a morbidity rate of 1.0 per 100,000 population. The morbidity rate for Vermont, as given by Hardy, Jordan and Borts, was 5.5, second only to Iowa, and those for Connecticut and Maine were 3.0 and 2.3, respectively. The relatively low incidence in Massachusetts is, of course, partly explained by the relatively high percentage of urban population, but the effect of fairly widespread pasteurization of milk cannot be disregarded.

REFERENCE

Hardy, A. V.; Jordan, C. F., and Borts, I. H.: Undulant fever: Further epidemiologic and clinical observations in Iowa. J. A. M. A. **107**:559 (Aug. 22) 1936.

THE EXTENSION OF THE NEW YORK HOSPITAL PLAN

THE success of the three-cents-a-day plan for the utilization of hospitals by the people of New York City and vicinity has been so pronounced that an extension of the service has been announced by the Associated Hospital Service.

Under the original plan more than a hundred thousand individuals have subscribed for the service rendered by nearly two hundred hospitals. The new plan provides for the care of a husband, wife, and unmarried children under nineteen years of age on a seven-cents-a-day

basis. Where the family consists of only husband and wife, the rate is five cents a day.

These two new plans are available only on the payroll reduction basis. That is, the fee is paid from the payroll of the participating prospective patient. The average period of illness is estimated to be twenty-one days.

Further explanation of the plan will be found on page 794.

ETHER DAY

THE celebration of Ether Day at the Massachusetts General Hospital this year was even more significant than usual for it marked the ninetieth anniversary of the first public demonstration of surgery made painless through the administration of an anesthetic. As is well known to the majority of New England physicians, it was on October 16, 1846, that Dr. John C. Warren performed an operation in the surgical amphitheater of the Massachusetts General Hospital on a young printer by the name of Gilbert Abbott, who had been rendered unconscious through the inhalation of ether, administered by Dr. W. T. G. Morton.

In a statement released by Dr. C. W. Munger, president of the American Hospital Association and signed by several hundred prominent individuals, this anniversary has been used to illustrate the contributions made to medical science by the voluntary or philanthropic hospitals throughout the United States. The statement urges the support of such institutions by the public and states, in part, "This anniversary is a symbol of the scientific progress made with the cooperation of voluntary hospitals. There is good reason to hope that similar progress can be made in the future provided adequate support is forthcoming.

"The contribution of the hospitals to the improvement of America's health is not to be measured merely in terms of humane care of the sick, but in lives saved, in pain eased, in doctors, nurses and other professional workers trained, in charitable ministration to the sick, in scientifically aiding the advancement of medicine through provision of workshops for the medical profession, in the prevention and the conquest of disease, and in the stimulation of governmental institutions to higher levels.

"We believe it absolutely essential that Americans realize that adequate support for their community hospitals is not a question of helping some one else, but is vital self-protection."

MATERNAL MORTALITY IN BOSTON

THE combined meeting on next Wednesday evening, October 28, at 8:15, at the Boston Medical Library, of the Suffolk District Medical Society with the Obstetrical Society of Boston to hear the report on Maternal Mortality in Boston for 1933-1935 should be well attended by all of those physicians interested in the welfare of Boston. The committee has analyzed carefully the causes of the maternal mortality for these three years, and the meeting should prove a very valuable one.

The discussion will be opened by Dr. Charles Wilinsky of the Boston Department of Health, with whose cooperation the study was undertaken. Dr. John T. Williams, president of the Obstetrical Society, will continue the discussion. The report will then be open for general discussion from the floor, and it is hoped that a free and frank expression of opinion will follow.

THIS WEEK'S ISSUE

CONTAINS articles by the following named authors:

BROWNE, WILLIAM E. M.D. Tufts College Medical School 1913. F.A.C.S. Surgeon-in-Chief, Second Surgical Service, Carney Hospital. Clinical Professor of Surgery, Tufts College Medical School. His subject is "The Necessity for Use of Splints at Certain Stages in the Treatment of Infections of the Hand, with a Demonstration of Some of the Newer Types." Page 743. Address: 587 Beacon Street, Boston, Mass.

HATT, R. NELSON. M.D. Tufts College Medical School 1918. F.A.C.S. Chief Surgeon, Shriners' Hospital for Crippled Children. Orthopedic Surgeon, Wesson Memorial Hospital Consulting Orthopedic Surgeon, Springfield Hospital, Springfield; Noble Hospital, Westfield, and Harrington Memorial Hospital, Southbridge. His subject is "Diseases and Injuries of the Hip Joint." Page 749. Address: 146 Chestnut Street, Springfield, Mass.

REID, MONT R. A.B., M.D. Johns Hopkins University School of Medicine 1912. Professor of Surgery, University of Cincinnati College of Medicine. Director of the Surgical Services at the Cincinnati General Hospital and the Children's Hospital. His subject is "Some Considerations of the Problems of Wound Healing." Page 753. Address: Cincinnati General Hospital, Department of Surgery, Cincinnati, Ohio.

MUNRO, DONALD. A.B., M.D. Harvard University Medical School 1916. F.A.C.S. Visiting Surgeon in charge of Neurological Surgery, Boston City Hospital. Assistant Professor of Neurological Surgery, Harvard University Medical School. Consultant in Neurological Surgery, Massachusetts Memorial Hospitals and Waltham Hospital. Associate Professor of Neurological Surgery, Boston University School of Medicine. His subject is "The Cord Bladder. Its Definition, Treatment and Prognosis

When Associated with Spinal Cord Injuries." Page 766. Address: 818 Harrison Avenue, Boston, Mass.

MARKS, JOSEPH H. B.A., M.A., M.D. Harvard University Medical School 1929. Roentgenologist, Truesdale Hospital, Fall River. His subject is "Roentgen Ray Findings in Diaphragmatic Hernia." Page 777. Address: 151 Rock Street, Fall River, Mass.

GOTTLIEB, JACQUES S. B.S., M.D. Harvard University Medical School 1933. Formerly, Member of Staff, Worcester State Hospital, Worcester, Mass.; Assistant Resident in Neurology, Montefiore Hospital, New York City; and Intern, Hahnemann Hospital, Worcester. Now, Resident and Instructor in Psychiatry, Psychopathic Hospital, University of Iowa Medical School, Iowa City, Iowa. His subject is "Undulant Fever. An Unusual Case with Necropsy." Page 781. Address: Psychopathic Hospital, Iowa City, Iowa.

The Massachusetts Medical Society

FOURTH ANNUAL POSTGRADUATE MEDICAL EXTENSION COURSE

The Massachusetts Medical Society Committee on Postgraduate Instruction submits the following programs of extension courses which include all of the districts that were not published in *The New England Journal of Medicine*, issue of September 24, 1936.

Frank R. Ober, Chairman
Leroy E. Parkins, Secretary.

BRISTOL SOUTH DISTRICT
(Fall River Section)

Postgraduate Extension Curriculum

November 9

Heart Disease. (Two Sessions.)

Session 1. Treatment of Cardiovascular Emergencies. Instructor—R. E. Glendy.

November 16

Session 2. The Prognosis of Heart Disease. Instructor—Ashton Graybiel.

November 23

Psychiatry. (One Session.)

(a) Psychobiology in General Medicine.
(b) The Common Neuroses.
Instructor—K. J. Tillotson.

November 30

Diabetes. (One Session.)

Complications of Diabetes and Their Treatment. Coma; Insulin Reactions; Surgery (Gangrene, Carbuncle, Etc.); Marriage and Pregnancy; Tuberculosis and Heart Disease. Instructor—Alexander Marble.

December 7

Lung Disease. (Two Sessions.)

Session 1. Pneumonia and Its Complications. Diagnosis and Treatment. Instructor—Roderick Heffron.

December 14

Session 2. Suppurative Lung Disease, Lung Abscess and Bronchiectasis. Instructor—F. T. Lord.

The course will be given at the Stevens Clinic of the Union Hospital, Fall River, on Mondays at 4 p. m.

HOWARD P. SAWYER, M.D.,
District Co-Chairman, Postgraduate Instruction.

BRISTOL SOUTH DISTRICT
(New Bedford Section)

Postgraduate Extension Curriculum

November 13

Heart Disease. (Two Sessions.)

Session 1. Treatment of Cardiovascular Emergencies. Instructor—Sylvester McGinn.

November 20

Session 2. The Prognosis of Heart Disease. Instructor—C. L. Derick.

November 27

Diabetes. (Two Sessions.)

Session 1. General Plan of Treatment in *Uncomplicated* Cases; Diet; Insulin (Regular and Protamine); Exercise. Instructor—H. F. Root.

December 4

Session 2. *Complications* of Diabetes and Their Treatment. Coma; Insulin Reactions; Surgery (Gangrene, Carbuncle, Etc.); Marriage and Pregnancy; Tuberculosis and Heart Disease. Instructor—H. F. Root.

December 11

Acute Abdominal Emergencies. (One Session.)
Instructor—H. M. Clute.

December 18

Anesthesia. (One Session.)

(a) Drugs in Anesthesia.
(b) General Care of Patient in Anesthesia.
Instructor—S. C. Wiggin.

The course will be given at St. Luke's Hospital, New Bedford, on Fridays at 4 p. m.

ROBERT H. GOODWIN, M.D.,
District Co-Chairman, Postgraduate Instruction.

MIDDLESEX NORTH DISTRICT

Postgraduate Extension Curriculum

November 6

Acute Abdominal Emergencies. (One Session.)

Instructor—A. W. Allen.

November 13

Heart Disease. (Two Sessions.)

Session 1. Treatment of Cardiovascular Emergencies. Instructor—S. A. Levine.

November 20

Session 2. The Prognosis of Heart Disease. Instructor—B. E. Hamilton.

November 27

Stomach and Duodenal Ulcer. (One Session.)

Diagnosis and Treatment. Instructor—E. S. Emery, Jr.

December 4

Blood Diseases. (Two Sessions.)

Session 1. The Hemoglobin and Red Blood Cells in Relation to Disease. Instructor—W. P. Murphy.

December 11

Session 2. Diseases Affecting the White Blood Cells. Leukemias; Agranulocytosis; Mononucleosis. Instructor—W. B. Castle.

The course will be given at St. Joseph's Hospital, Merrimack Street, Lowell, on Fridays at 7 p. m.

SAMUEL A. DIBBINS, M.D.,
District Chairman, Postgraduate Instruction.

NORFOLK SOUTH DISTRICT

Postgraduate Extension Curriculum

November 9

Arthritis. (One Session.)

Diagnosis and Treatment. Instructor—H. A. Nissen.

November 16

Diabetes. (Two Sessions.)

Session 1. General Plan of Treatment in *Uncomplicated* Cases; Diet; Insulin (Regular and Protamine); Exercise. Instructor—Priscilla White.

November 23

Session 2. *Complications* of Diabetes and Their Treatment. Coma; Insulin Reactions; Surgery (Gangrene, Carbuncle, Etc.); Marriage and Pregnancy; Tuberculosis and Heart Disease. Instructor—Priscilla White.

November 30

Psychiatry. (One Session.)

(a) Psychobiology in General Medicine.
(b) The Common Neuroses.

Instructor—H. C. Solomon.

December 7

Blood Diseases. (Two Sessions.)

Session 1. Diseases Affecting the White Blood Cells. Leukemias; Agranulocytosis; Mononucleosis. Instructor—M. B. Strauss.

December 14

Session 2. The Hemoglobin and Red Blood Cells in Relation to Disease. Instructor—G. R. Minot.

The course will be given at the Quincy City Hospital, Quincy, on Mondays at 8:30 p. m.

DAVID L. BELDING, M.D.,
District Chairman, Postgraduate Instruction.

PLYMOUTH DISTRICT

Postgraduate Extension Curriculum

November 10

Lung Disease. (One Session.)

Pneumonia and Its Complications. Diagnosis and Treatment. Instructor—Roderick Heffron.

November 17

Acute Abdominal Emergencies. (One Session.)

Instructor—S. J. G. Nowak.

November 24

The Physical Examination. (One Session.)

Its Scientific, Clinical and Economic Implications. Instructor—L. E. Parkins.

December 1

Blood Diseases. (One Session.)

The Hemoglobin and Red Blood Cells in Relation to Disease. Instructor—C. W. Heath.

December 8

Stomach and Duodenal Ulcer. (One Session.)

Diagnosis and Treatment. Instructor — T. V. Urmy.

December 15

Diabetes. (One Session.)

General Plan of Treatment in *Uncomplicated* Cases; Diet; Insulin (Regular and Protamine); Exercise. Instructor — Reginald Fitz.

The course will be given at the Brockton Hospital, Brockton, on Tuesdays at 4 p. m.

WALTER H. PULSIFER, M.D.,
District Chairman, Postgraduate Instruction.

WORCESTER NORTH DISTRICT

Postgraduate Extension Curriculum

November 13

Psychiatry. (One Session.)

(a) Psychobiology in General Medicine.
(b) The Common Neuroses.
Instructor—H. C. Solomon.

November 20

Blood Diseases. (Two Sessions.)

Session 1. The Hemoglobin and Red Blood Cells in Relation to Disease. Instructor—C. W. Heath.

November 27

Session 2. Diseases Affecting the White Blood Cells. Leukemias; Agranulocytosis; Mononucleosis. Instructor—W. B. Castle.

December 4

Diabetes. (Two Sessions.)

Session 1. General Plan of Treatment in *Uncomplicated* Cases; Diet; Insulin (Regular and Protamine); Exercise. Instructor—E. P. Joslin.

December 11

Session 2. *Complications* of Diabetes and Their Treatment. Coma; Insulin Reactions; Surgery (Gangrene, Carbuncle, Etc.); Marriage and Pregnancy; Tuberculosis and Heart Disease. Instructor—E. P. Joslin.

December 18

Acute Abdominal Emergencies. (One Session.)

Instructor—H. M. Clute.

The course will be given at the Burbank Hospital, Fitchburg, on Fridays at 4:30 p. m.

EDWARD A. ADAMS, M.D.,
District Chairman, Postgraduate Instruction.

SCHEDULE FOR WEEK BEGINNING OCTOBER 26

Barnstable

Sunday, November 1, at 4:00 p. m., at the Cape Cod Hospital, Hyannis. Subject: Diseases Affecting the White Blood Cells. Leukemias; Agranulocytosis; Mononucleosis. Instructor: C. S. Keefer. John I. B. Vail, Chairman.

Berkshire

Thursday, October 29, at 4:30 p. m., at the House of Mercy Hospital, Pittsfield. Subject: Stomach and Duodenal Ulcer: Diagnosis and Treatment. Instructor: T. V. Urmy. Melvin H. Walker, Jr., Chairman.

Essex South

Tuesday, October 27, at 4:00 p. m., at the Salem Hospital, Salem. Subject: *Complications* of Diabetes and Their Treatment. Coma; Insulin Reactions; Surgery (Gangrene, Carbuncle, Etc.); Marriage and Pregnancy; Tuberculosis and Heart Disease. Instructor: Reginald Fitz. Walter G. Phippen, Chairman.

Franklin

Wednesday, October 28, at 8:00 p. m., at the Franklin County Public Hospital, Greenfield. Subject: Diseases Affecting the White Blood Cells. Leukemias; Agranulocytosis; Mononucleosis. Instructor: C. W. Heath. Halbert G. Stetson, Chairman.

Hampden

Thursday, October 29, at 4:00 p. m., at the Academy of Medicine, Professional Building, 20 Maple Street, Springfield, and at 8:30 p. m., in the Outpatient Department of the Skinner Clinic, Holyoke Hospital, Holyoke. Subject: Neurological Surgery: The Signs and Symptoms of the Common Brain Lesions—Organic and Traumatic. Instructor: Donald Munro. George L. Schadt and George D. Henderson, Chairmen.

Hampshire

Wednesday, October 28, at 4:15 p. m., in the Nurses' Home of the Cooley Dickinson Hospital, Northampton. Subject: Stomach and Duodenal Ulcer: Diagnosis and Treatment. Instructor: E. S. Emery, Jr. Robert B. Brigham, Chairman.

Middlesex East

Tuesday, October 27, at 4:00 p. m., at the Melrose Hospital, Melrose. Subject: Anesthesia: (a) Drugs in Anesthesia. (b) General Care of Patient in Anesthesia. Instructor: P. D. Woodbridge. Joseph H. Fay, Chairman.

Middlesex South

Tuesday, October 27, at 4:00 p. m., at the Cambridge Municipal Hospital, Cambridge. Subject: Dermatology and Syphilis: (a) Common Skin Diseases. (b) Diagnosis and Treatment of Early Syphilis. Instructor: E. L. Oliver. Edmund H. Robbins, Chairman.

Norfolk

Friday, October 30, at 8:30 p. m., at the Norwood Hospital, Norwood. Subject: Diabetes: General Plan of Treatment in *Uncomplicated* Cases; Diet; Insulin (Regular and Protamine); Exercise. Instructor: Alexander Marble. Hugo B. C. Riemer, Chairman.

Worcester (Milford Section)

Thursday, October 29, at 8:30 p. m., in the Nurses' Home of the Milford Hospital, Milford. Subject: Heart Disease: Treatment of Cardiovascular Emergencies. Instructor: J. M. Faulkner. Joseph Ashkins, Sub-Chairman.

ESSEX SOUTH DISTRICT MEDICAL SOCIETY

APPLICANTS FOR EXAMINATION BY CENSORS

Dr. Walter Louis Piotrowski, of Peabody, a graduate of Middlesex College School of Medicine, is a candidate for the Massachusetts Medical Society. Recommended by: Dr. J. W. P. Murphy, Dr. S. Chase Tucker, Dr. John F. Jordan, Dr. Ralph E. Foss, Dr. P. J. Finnegan.

R. E. STONE, M.D., *Secretary.*

MISCELLANY

THE ASSOCIATED HOSPITAL SERVICE OF NEW YORK

Under a recent announcement, family membership has been added to the three-cents-a-day plan for hospital care.

The amount and manner of payment of annual subscription charges are as follows:

	Annually	Semi-Annually	Quarterly	Monthly
1. Individual subscription	$10.00	$5.10	$2.60	$.90
2. Husband and wife	18.00	9.00	4.50	1.50
3. Husband, wife and all unmarried children under 19 years of age	24.00	12.00	6.00	2.00

Monthly payments are accepted only by means of payroll deduction. Payments by subscribers as individuals may be made direct by each subscriber to the Associated Hospital Service upon written notice. An initial payment must accompany each application except when the payroll deduction method is used, as in the case of family groups.

WHO MAY JOIN

Since there are no occupational restrictions, salary limitations or physical examinations, only persons in good health and not more than 65 years of age who reside in the area served by member hospitals may become subscribers.

Eligible persons may now enroll as members of a family group as well as individuals in accordance with the enrollment regulations described in the folder. A family group will include:

1. Husband and wife.
2. Husband, or wife and all their unmarried children under 19 years of age.

Either the husband or wife, who is employed, may act as the family representative of such a family group. Such members of families, however, may enroll as a family group only when the family representative makes payment of subscription charges by means of *payroll deduction* through the cooperation of the employer.

Other members of a family or household may enroll provided their applications are submitted by another member of the family or household who is an employed subscriber. Once a person's application is accepted at the age of 65 or less, he may continue as a subscriber indefinitely.

WHAT THIS PLAN OFFERS YOU

Every subscriber, including family members accepted by the plan, is entitled to any or all of these services which his own doctor says he needs:

Hospital care for 21 days in one or more admissions.

Semi-private accommodations (2 to 4 beds in a room, not a ward).

Use of the operating room.

Use of the maternity delivery room (after you have been a subscriber for one year).

Necessary x-ray and laboratory examinations for bed patients requiring hospital care.

Anesthesia is included only when administered by a salaried employee of the hospital.

General nursing care.

Routine medications and dressings.

Private room upon the payment of the difference between $4.50 and the daily rate of the room selected. Subscribers selecting a private room also are entitled to all the other services listed above.

Discount of 25 per cent off semi-private hospital charges after first 21 days.

These services will be rendered for any illness or injury except pulmonary tuberculosis, venereal diseases, those provided for under the Workmen's Compensation Law of any state, quarantinable diseases or mental disorders. Maternity service will include the nursery care of the mother and the new-born child, provided the mother has been a subscriber for one year or longer.

SERVICES NOT INCLUDED

The service rendered to you by a physician or surgeon and special private nurses are not included. X-ray and laboratory examinations when the subscriber is admitted to a member hospital solely for diagnostic purposes also are not included under the plan, nor does the plan include services for conditions resulting from pregnancy during the first year of enrollment.

WHEN SUBSCRIBER GETS SERVICE

Accident or Emergency Illness: immediately after subscriber's application has been accepted.

Other Illness or Injury: any time after you have been a member for 10 days.

Hospital Maternity Care: any time after you have been a member for one year.

Your doctor's decision that you need hospital treatment is all that is necessary to receive service.

Hospital service will not include the treatment of conditions known to the subscriber to exist and to require hospital care at the date of application.

GROUP ENROLLMENT

(A) For employed persons in organizations where there are more than 25 employees or members.

1. Such persons may enroll only by submitting their applications with a group formed among their fellow employees or members.
2. Only under the following conditions are no specified number of applications required, except for the minimum of 10 applications from employed persons:
   When the employer or directing head of any organization extends cooperation whereby the plan is fully presented to all or nearly all employed members in a manner mutually agreed upon.
3. Once an organized group of employed subscribers has been formed and submitted, no additions may be made to such group except under special arrangements.
4. Employed persons who subscribe as members of such a group may enroll the members of their household, such as wives, children, and so forth, regardless of number, either as individuals or as members of a family group.

(B) For employed persons in organizations where there are less than 25 employees, and persons self-employed or self-supporting but not employed.

5. Such employed persons may form a group of subscribers who likewise are employed in organizations having less than 25 employees.
6. Such an independently formed group must include at least 10 applications from employed persons. Such subscribers may enroll the members of their household, such as wives, children, and so forth, regardless of number, but for the present will not be entitled to enroll as a family group as described in the folder.
7. After such a group of applications has been submitted, *no additions will be accepted.* Members of the subscriber's household not included in the original group may enroll only in a new group in accordance with these regulations.

REQUIREMENTS FOR APPROVAL OF COLLEGES, UNIVERSITIES AND MEDICAL SCHOOLS

The following qualifications will be required by the Approving Authority of the Commonwealth of Massachusetts for approval of a college or university giving two years of premedical collegiate work, and for approval of a medical school.

STEPHEN RUSHMORE, M.D., *Chairman,*
Approving Authority.

October 16, 1936.

QUALIFICATIONS REQUIRED FOR APPROVAL OF A COLLEGE OR UNIVERSITY AS GIVING TWO YEARS OF PREMEDICAL COLLEGIATE WORK, INCLUDING PHYSICS, CHEMISTRY AND BIOLOGY.

(a) The institution will be approved if it has already been approved by the Association of American Universities or the Regional Association of Colleges and Secondary Schools in the territory in which the institution is located.

(b) Since approval by the above noted organizations may be lacking because it has not been sought or has been refused, and since an educational institution should be judged by its objectives and its adequacy in attaining these objectives, specific requirements may present considerable variation. The following general requirements have, however, been established:

(1) The curriculum should presuppose educational qualifications required for graduation from a public high school as a condition for entrance to the institution.

(2) The instruction should be at the collegiate level generally required of institutions giving similar curricula in the regional group.

(3) Since the teacher is the heart of an educational institution, the competence of the faculty, the organization of the faculty, the working conditions for the faculty and the quality of the instruction will receive special attention.

(4) The physical facilities, including library, must be adequate for the objective of the institution.

(5) The administrative organization and personnel should be adequate for accomplishing the objectives of the institution.

(6) The institution should provide evidence of the financial resources adequate for and effectively applied to the support of its educational program.

QUALIFICATIONS REQUIRED FOR APPROVAL OF A MEDICAL SCHOOL

The minimum requirements for an approved medical school as set by the statute and by ruling of the Approving Authority under the statute are as follows:

(1) The school must be legally chartered.

(2) If the school confers degrees in medicine, the school must be legally empowered to confer degrees in medicine.

(3) If the school confers degrees in medicine, the school must see to it that the statutory conditions are fulfilled, namely, that the candidate shall have taken a course of at least four years of not less than thirty-two weeks in each year before the degree is conferred.

(4) If the power of the school to confer degrees is restricted under the charter, the degrees conferred must be under the restriction of the charter.

(5) The school must restrict admission of candidates to those who have had at least two years of premedical work in an approved college, including courses in physics, chemistry and biology.

(6) A candidate seeking admission to an approved school, after attendance in a nonapproved school, must receive specific approval from the

Authority both as to admission and status after admission.

(7) A candidate admitted to advanced standing must spend at least one year in the school, completing the regular fourth or last year course of study, if the four-year course is given, or the year next preceding the year of internship, if internship is required for graduation, before the degree is conferred. Before admission to such fourth year, the candidate seeking admission to advanced standing must fulfill all the conditions required of candidates for admission to the fourth year who have taken the uninterrupted course.

(8) The administration of the school must be under the supervision and control of a dean or other administrative officer who is familiar with contemporary medical education, its standards and procedures, and who has authority adequate for the proper performance of his duties.

(9) The school must provide adequate preclinical courses in anatomy (including histology and embryology), physiology (including biochemistry and pharmacology) and pathology (including bacteriology and immunology). Average courses for these groups are approximately as follows: anatomy group 15 per cent of the whole medical course; physiology group 15 per cent; pathology group 15 per cent. The whole medical course should cover approximately 4,000 hours.

(10) For the preclinical courses there should be no less than nine full-time teachers of professional rank: for anatomy group, three; physiology group, three; pathology group, three. There must be adequate full-time or part-time assistants, and technicians. This estimate is on the basis of fifty students in each class.

(11) In order that a teacher may be regarded as adequate for a full-time professorship (professor, associate professor, assistant professor) he must (1) have had adequate opportunity to become familiar with his subject; (2) have had adequate experience as a teacher of his subject; and (3) have attained such a position in his profession that he is recognized by his fellow workers in his specialty as competent.

(12) The laboratories for each preclinical subject must be adequate with ample desk room for work, and locker room for supplies and equipment.

(13) Each department must have equipment adequate for its needs, for demonstration purposes as well as for routine work with students, for research by members of the faculty, and there must be a sufficient number of rooms for meetings of whole classes for lectures or demonstrations with accessory apparatus for these purposes.

(14) There must be an adequate working library for the school, with books of reference and magazine files; and tables or desks for work, under the charge of a competent librarian.

(15) There must be adequate clinical material available for teaching purposes, for all branches of medicine, with especial emphasis on medicine, surgery and obstetrics.

(16) The records of the school must be adequate to show the actual condition of the school, and the status of each student, including his premedical record.

(17) The financial statement of the school must be so presented as to show whether the school is or is not actually conducted in accordance with its charter as a noncommercial institution.

CONNECTICUT NEWS

Vital Statistics

The birth rate in Connecticut for the first six months of 1936 was 12.5 per 1,000 population, the lowest for a similar period in the last three years. A corresponding decrease in marriages for the same period was recorded, the total number dropping from over 5,000 to a little over 3,000. It is a debatable question whether this decrease in marriages resulted from the new marriage law effective January 1 and requiring blood Wassermanns on all applicants. The mortality rate for this six months' period remained about constant at 10.9 per 1,000 population. During the month of June the total number of births recorded was 1,894, a rate of 13.2 per 1,000 population, the lowest rate to appear for June in the last six years. The total number of deaths for the same month was 1,381, a rate of 9.6 per 1,000 population. Forty-seven stillbirths were reported for June with approximately equal sex distribution.

George R. Eckert, M.D., has been appointed health officer of New Fairfield to fill the unexpired term of Nathaniel B. Selleck, Jr., M.D.

Attorney General's Opinion on Marriage Law

The marriage license law as amended in 1935, Section 1595c, Section 2, states in part that . . . "No application shall be accepted by such registrar until there shall be in possession of such registrar a statement or statements signed by a licensed physician . . ." When the Attorney General's office was asked whether a Federal Medical Officer could make such certification, it was stated that "physicians must be licensed to practice in Connecticut, and a United States Medical Officer, whether in the army, navy or public health service who does not hold a Connecticut license cannot issue a statement that will comply with the law, as this work is not done while acting in the scope of his employment."

Social Security Fund Grant for Hartford

Early in August the Health Board of Hartford received word that it had been allowed a grant of $9,000 from funds set apart by the Social Security Act for the development of a national public health program. This section of the act is administered by the United States Public Health Association. Dr.

Benjamin G. Horning, city health officer, told the commissioners that this money would be used for the development of a constructive health program for the city. Immediately a new laboratory technician was hired. Among the duties of this new technician will be the testing of glasses, from taverns around the city, for bacilli. He will also assist in Wassermann and other blood examinations.

Dr. Horning had previously submitted a request for this money to Dr. Stanley H. Osborn, State health commissioner, who endorsed it and forwarded the request to Washington, where it was finally approved. Although regulations provide that the details of the proposed health program must accompany the request for the grant, an exception was made in the case of Hartford as Dr. Horning, who had just been appointed health officer at the time he submitted the request, had not had the time to formulate such a program.

The Problem of Medical Testimony

The Editor of the *Connecticut Bar Journal* devoted a large part of the August issue of that publication to the difficulties that the members of the medical profession are experiencing in the matter of expert testimony. Although Connecticut has a relatively small number of pleas of insanity in the criminal cases with which it has to deal, it has its full share of court cases in which the decision rests on whether the accused person was under the influence of liquor at the time of the crime, ordinarily an automobile accident.

To quote the Editor of the *Hartford Courant*, "The determination as to whether a person is under the influence of liquor is in many cases not easy. Even a test showing that a certain amount of alcohol has been consumed is not certain evidence of drunkenness, for individuals vary widely in their tolerance of liquor. Yet physicians are frequently called on to give expert testimony as to whether a driver was intoxicated in borderline cases when another physician, equally skillful and equally sincere, might arrive at a contrary decision. Clearly the condition offers itself to easy abuse. Whether he is called for the defendant or for the State, a physician is under a strong, if frequently unrecognized temptation to testify in favor of the side that employs him. A few doctors may let their friendships, their professional connections or their witness fees consciously affect their testimony, though the practice is certainly not so prevalent as has been charged. But whether the testimony is honestly given, as in general it is, or is biased by the physician's personal feelings, it is always open to lay suspicion, unfair as that suspicion generally is. In the interests not only of the reputation of the profession but of removing the embarrassing situations in which its members too often find themselves, most physicians are heartily in favor of changing the system of giving expert testimony. But as to the exact nature of the changes, the profession is not in agreement. There it is that the legal profession can help the physicians. They seek a method of providing expert testimony in borderline cases that will remove the possibility of bias and personal prejudice. Difficult as the problem is to solve, it should not be impossible."

The first issue of the *Journal of the Connecticut State Medical Society* appeared a few days following the *Bar Journal* and by coincidence contained an article on "Medical Expert Testimony" by Dr. Thomas P. Murdock, retiring president of the Society, as well as an editorial on this subject. In Dr. Murdock's paper a plan was offered whereby the State Medical Society would submit to His Excellency, the Governor, the names of a group of doctors covering all the specialties in medicine. From this list of names thus submitted, the governor would appoint a desired number to be known as commissioners or referees of the superior court. From the approved list of referees the judge to sit in a particular case would select one to take medical testimony. The referee or commissioner would then submit his report to the court, after duly weighing the testimony on both sides, this report to be read as evidence to the jury.

Whether or not the plan as proposed by Dr. Murdock is practical, it has set the members of the medical profession in Connecticut to thinking, and this in due time should result in action. Already the Editor of the new medical journal has received expressions of opinions from other members of the Society, evidence of interest on foot to remedy the present evil situation.

Paul H. Brown, M.D., health officer of East Haven, has joined the staff of the State Department of Health as an epidemiologist in the Bureau of Preventable Disease. Dr. Brown succeeds J. S. Cunningham, M.D., who will be on leave of absence for one year to attend the Harvard School of Public Health. Dr. Brown is studying at the Yale School of Public Health and will devote part time only to the State Department work.

Dr. Osborn, State Commissioner of Health, recently predicted that in a year or so Connecticut would lower its neonatal and infant death rate to an astonishing extent because of the forward step it has taken in the passage of its new marriage law. Investigation has shown that there are more than 2,000 cases of syphilis annually in Connecticut and that there are more cases among single men than there are among single women and also more among married women than among single women. By virtue of a compulsory Wassermann test on all applicants for a marriage license, it is expected that a closer control of cases of syphilis among single men and women may be established and a further reduction in congenital syphilis effected.

Changes at the Hartford Hospital

Dr. Wilmar Mason Allen was appointed Director of the Hartford Hospital at a meeting of the Execu-

tive Committee held on September 18, 1936. Dr. Lewis A. Sexton, for twenty years superintendent of the hospital, obliged to relinquish his duties because of ill health, was named Director-Emeritus and the post of superintendent was discontinued.

Dr. Allen, who since 1925, has been pathologist and bacteriologist at the Hartford Hospital, was born in 1894 at Chattanooga, Tenn. He received his A.B. degree at Haverford College in 1916 and his M.D. degree at Johns Hopkins University School of Medicine in 1920. He interned at Henry Ford Hospital in Detroit from 1920 to 1921. From 1921-1922 he was director of the Central Laboratory in Saginaw, Mich., during which time he was also pathologist at the Saginaw General Hospital and St. Mary's Hospital. The new director of the Hartford Hospital was assistant resident and instructor in Johns Hopkins Hospital and Johns Hopkins University School of Medicine from 1922 to 1925. Then came his appointment as pathologist and bacteriologist at the Hartford Hospital, positions he held until his recent appointment. He is also consulting pathologist for the Newington Home for Crippled Children, Mt. Sinai Hospital and the Neuro-Psychiatric Institute and Hospital of the Hartford Retreat. Dr. Allen is a member of the Hartford Medical Society, the Hartford County Medical Association and the Connecticut State Medical Society. He is a fellow of the American Medical Association, a fellow of the American College of Physicians and a fellow of the American Society of Clinical Pathologists.

Dr. Sexton, who relinquishes the more arduous duties in connection with the management of the hospital, but who will still act in a consulting and advisory capacity, gained a national reputation as a hospital administrator during his service as superintendent. During his administration the number of beds at the hospital was increased from 400 to 780 and many new buildings were erected.

Dr. Ralph Tovell has been appointed head of the Department of Anesthesia. He comes directly from the Mayo Clinic at Rochester, Minnesota, where he was chief anesthetist. Dr. Tovell is a native of Sydenham, Ontario, and a graduate of Queen's University. He completed his postgraduate work in New York and Toledo, and was assistant professor of anesthesia at the University of Minnesota before becoming associated with the Mayo Clinic in 1929.

STOLL—Henry Farnum Stoll, M.D., of West Hartford, Connecticut, died suddenly of coronary thrombosis at his home on the morning of September 28, 1936. Dr. Stoll began his practice in Hartford soon after completing his internship at the Hartford Hospital, following his graduation from the College of Physicians and Surgeons in New York in 1902. He was born May 25, 1878, in Port Jervis, N. Y., a son of Albert and Lizzie Farnum Stoll, and was graduated from Cornell University. During the World War, he was a member of the faculty at Walter Reed Hospital in Washington, and was raised to the rank of major from a captaincy. He retired after his army service with the rank of lieutenant colonel, and returned to Hartford to resume his practice. Dr. Stoll was a consulting physician for Wildwood Sanatorium, Newington, Windham County Memorial Hospital, Willimantic, Manchester Memorial Hospital, New Britain General Hospital and Bristol Hospital. He was a fellow of the College of Physicians, and held memberships in the city, county and state medical associations. He also was a member of the Twentieth Century Club and Lafayette Lodge, A. F. & A. M. He leaves his widow, Eleanor Roberts Stoll; a daughter, Miss Hortense Stoll, of West Hartford; a brother, John Westbrook Stoll, of Espanola, New Mexico, and a sister, Miss Augustine B. Stoll, of Santa Cruz, New Mexico.

BLACK—Ross E. Black, M.D., aged 56 years, one of New London's leading physicians for about one-quarter of a century, died suddenly at a New York hotel on September 27, 1936. Dr. Black went to New York to visit for the week-end and it was expected that he would return to New London not later than Monday. It is known that the physician, who registered at a New York hotel, was apparently in excellent health when he departed from New London. His academic work was done at Juniata College, Huntington, Pa., his birthplace. He then received his medical training at Columbia University. Twenty-eight years ago, after he had been an intern at North Brothers Island Hospital and several other hospitals in and near New York, Dr. Black started practice in New London. At that time he was a member of the staff of the Memorial Hospital.

Dr. Black served as captain of a medical corps unit during the World War and was a member of the New London County and State Medical Associations. He was also on the board of directors of the Home Memorial Hospital Association and medical examiner for the town of Waterford. He was a thirty-third degree Mason and a member of the Harbour Club.

Dr. Black married Laura Ellen Page of New London on April 3, 1913. He leaves his widow and small son, Ross Elliot, Jr., and a brother, Dr. John T. Black, former health officer of the city of New London, now a resident of Hartford.

MAINE NEWS

The fourth annual clinical session of the Maine Medical Association was held in Waterville, October 15 and 16, 1936, with headquarters at the Elmwood Hotel.

Each day of the session was divided into four periods, and eight clinics were offered for each period.

Thursday evening, the Kennebec County Medical Association held its regular monthly meeting, the program of which consisted of a panel discussion of Poliomyelitis. This discussion was participated in

by a number of the leading authorities of the country, including Dr. John A. Kolmer, Philadelphia, Professor of Medicine at Temple University; Dr. Josephine B. Neal, New York, Professor of Neurology at Columbia University; Dr. William L. Aycock, Boston, Assistant Professor of Preventive Medicine and Hygiene, Harvard University; and Dr. Arthur T. Legg, Assistant Professor of Orthopedic Surgery at Harvard.

The program for Friday evening, the 16th, was under the auspices of the State Association. Medical Economics, as applied to Maine, was discussed. This program represented the joint effort of the Committee on Medical Economics and the Maine State Planning Board and was the result, to date, of the survey being conducted by these groups in regard to medical conditions in the state of Maine.

At this meeting, for the first time, the State Association devoted an entire program to questions of medical economics.

Clinical demonstrations and conferences were held, during the mornings and afternoons of both days, at the Central Maine Sanatorium, the Elm City Hospital, the Sisters Hospital and the Thayer Hospital.

The clinics were apportioned between surgery, medicine, gynecology and obstetrics, tuberculosis, pediatrics, ophthalmology, otolaryngology and roentgenology, so that one might choose those subjects of interest. Men were assigned to the clinics in order of application and each group was limited to 15 men, to avoid overcrowding. Each clinic continued for 1 hour, after which there was a half-hour intermission for discussion or going to the next selected clinic.

Luncheons were served at the Sanatorium and the Sisters Hospital. Clinics closed each day at 4:30 p. m. to allow for a social period at the Elmwood Hotel before dinner, which was served at 6:30 p. m.

The Council met each day at 12:15 p. m. The Fall meeting of the County Secretaries was held Thursday, October 15, at 5:00 p. m. The Editorial Board met at that time.

ANNOUNCEMENT OF PLANS FOR EXTENDING INFORMATION TO PHYSICIANS CONCERNING THE USE OF OFFICIAL MEDICINES

The therapeutically useful substances recognized by the Pharmacopoeia have been intended, in each revision, to represent the most widely used medicines of that generation and decisions as to "admissions" and "deletions" early, in each Revision, become one of the most important responsibilities of the Revision Committee.

During the last three revisions this feature has been particularly important since the medical profession, during that period, has revolutionized the methods for evaluating therapeutic efficiency and has been demanding satisfactory evidence of clinical value before accepting a new medicinal product.

In the current Revision this feature of the program has been especially emphasized and the Sub-Committee on Scope has earnestly endeavored to establish a list of official medicines which could be depended upon to represent the most advanced knowledge of therapeutics. The Scope Sub-Committee has been equally determined that these be limited to dependable medicines and also that they cover every need of the physician, so far as such products are available.

With the publication of the Eleventh Revision, the Committee has authorized a program which subjects these decisions on scope to a most searching review, and at the same time provides for its prompt revision should that seem wise in the light of new information.

To carry out this program and at the same time widely extend authentic information to physicians concerning the use of official medicines, a special Committee was appointed which is now carrying out an intensive program through the wholehearted cooperation of the American Medical Association. Every feature of this program has received the approval of both the U. S. P. and the A. M. A. representatives before adoption.

It was decided that a series of articles presenting the therapeutic side of specific diseases, or dealing with substances having similar physiologic activity, would be published in the *Journal of the American Medical Association*, an article to appear each two weeks for at least a year. When the first twenty-four titles had been selected after the study of fifty or more which had been proposed, the eighteen physician members of the U. S. P. Committee were invited to suggest the names of clinicians especially well qualified to prepare the articles. A half dozen or more names were suggested for each subject and from these one physician was selected, by mutual agreement, to be invited to write the article.

Already eighteen of these completed papers have been received and submitted for review and approval to both the U. S. P. and the A. M. A. groups. Each article is to be about 3,000 words in length, corresponding to about five columns in the *A. M. A. Journal*.

It was further realized that unless some plan could be developed for more specifically calling the attention of physicians to these presentations, than would result from their initial publication in the *Journal*, that they would largely fail to perform their purpose. Therefore certain additional features have been developed as outlined below:

An auxiliary Committee of professional pharmacists was appointed to assist in preparing a corresponding series of articles to go to the pharmaceutical press, and also to plan a series of exhibits which would graphically call attention to each article. These exhibits are to be set up first in the headquarters of the Philadelphia County Medical Society at the same time that the medical article appears in the *A. M. A. Journal*, and an illustration and description of these exhibits will be made a feature of each pharmaceutical article. These parallel pharmaceutical articles, calling attention to the medical articles appearing on a specific date in the *A. M. A. Journal*, will be set up in advance by the

A. Ph. A. Journal, reprints will be made, carrying a release date, which date will be the same as that of the medical article, and all Journals, which care to do so, can publish the pharmaceutical articles simultaneously. It will be sent to seventy or more pharmaceutical journals and it is hoped that many will regularly publish it under the caption of "The Pharmacopoeia" for the information and guidance of pharmacists throughout the country.

It is planned that reprints of the medical articles will also be made available, through the office of the Chairmen of the U. S. P. Committee on Revision, so that pharmacists can get these promptly to present regularly to their physician friends. These reprints will be punched and an attractive cover provided, so that by the end of the year the physician receiving the reprints from his pharmacist friend, each two weeks, will have a valuable text on therapeutics which he is likely to consider worth keeping and using. It is expected that each article will suggest a number of prescriptions and the pharmacist, in presenting the reprint to a physician, can also leave with him one of the prescriptions suggested, filled in his own pharmacy, and illustrative of the professional qualifications of the pharmacist.

A feature of the plan also includes the ultimate publication of the series as a bound book to be thus made available to students in medical schools, to medical interns, and to physicians in practice.

It is also hoped that exhibits, covering each article, will be made in many hospitals throughout the country, also at the headquarters of many County Medical Societies, and before state and national medical conventions.

An announcement of each article and a list of the therapeutic items recommended for the specific treatments discussed will also be made available to the manufacturers of medicinal products, and they will be invited to cooperate wholeheartedly in making this program a success. Many of the official substances recommended for use in prescriptions must be made and supplied by our splendidly organized chemical and pharmaceutical laboratories, and these organizations should be prepared to meet the demands for these official products.—*The Committee of Revision of the Pharmacopoeia of the United States of America.*

INSURANCE MEDICAL DIRECTORIES

The attention of all members is called to the following resolution adopted by the Society at the Hot Springs meeting April 29:

"Whereas, certain commercial interests are publishing medical directories, listing physicians by specialty and otherwise, as available for insurance and compensation work, and other professional services, and

Whereas, participation by listing in these lay publications merely serves for the profit of the promoters, and is furthermore technically indirect solicitation of patients.

Therefore, Be It Resolved, That the Arkansas Medical Society condemns these practices as unethical and forbids its members to continue listing their names in such directories, and

Be It Further Resolved, That the Arkansas Medical Society requests the House of Delegates of the American Medical Association to take similar action."

The resolution was presented to the House of Delegates of the American Medical Association and referred to the Judicial Council for study. The Judicial Council approved the resolution and recommended its adoption, which the House of Delegates did at the session of May 14, 1936.

The attention of our members has been previously called to the activities of these directory publishers. As is often the case, individual physicians felt that they might incur a loss if they removed their names from such directories while other members retained their listing. With this thought in mind, the above resolution has been adopted. The practice of so listing is declared unethical; no individual member may now feel that should he remove his name that another physician will accept that listing. The benefit is direct to these physicians in the fees saved; the lost is entirely the promoter's.

Some idea of the financial gains involved in the publication of these directories may be understood when we state that one directory now on our desk contains the names of approximately 5,000 physicians. Ninety-two Arkansas physicians are listed in the three directories available to *The Journal*. The fee charged for listing in this one directory is $15.00 per annum. A liberal estimate of the cost of publication and distribution is $15,000. The balance, $60,000, is presumably divided between the promoter and his solicitors. Verily, a most altruistic motive prompts the publication.

ANOTHER DROP IN THE BIRTH RATE

For the first time in 10 years the American birth rate showed, in 1934, a rise over the preceding year. This encouraged the hope that the long period of falling birth rates had at last run its course; and that the threat of an ultimately declining population, which is implied in the continued downward trend of the birth rate in the United States, might be on the way to being averted.

It now develops, however, that the slight increase in 1934 was only a temporary deviation from the general downward trend; for provisional figures now at hand for 1935 show that the birth rate has again taken a downward turn, from a rate of 17.1 per thousand in 1934 to 16.8 in 1935. We are thus almost back to the all-time low birth rate in the United States, which was 16.6 in 1933.

It is of interest to note what part the several States of the Union had in this general decline. Each of 33 states and the District of Columbia, comprising 59 per cent of the country's population, showed a fall in the birth rate. This group included every state, with two exceptions, in New England and in the Middle Atlantic, the West North Central, and the

West South Central Divisions. Six states, comprising 20 per cent of the population, recorded no change in the birth rate from 1934 to 1935. This leaves nine states, representing 21 per cent of the population, which registered increases. Three of these (Illinois, Michigan, and Wisconsin) were in the East North Central Division. Three others (Arizona, Colorado, and Montana) were in the Mountain Division. The remaining three to show rises were California, Florida and Mississippi.—*Statistical Bulletin, Metropolitan Life Insurance Company*, September, 1936.

RECENT DEATHS

REYNOLDS—Edward Reynolds, M.D., of 321 Dartmouth Street, Boston, died at his home, October 16, 1936. He was born in Boston in 1860, the son of Dr. John Phillips Reynolds, who was Professor of Obstetrics at the Harvard Medical School from 1877 to 1886.

After graduating from Harvard College, Dr. Edward Reynolds entered the Harvard Medical School, graduating therefrom in 1885. Dr. Reynolds devoted his practice to Obstetrics and Gynecology and was one of the earlier students of the problems of sterility in women. He was a facile writer and impressive speaker when dealing with the facts and theories relating to Obstetrics and Gynecology and his ability led to a teaching position at the Harvard Medical School, and Staff positions at the Massachusetts General Hospital, the Boston Lying-in Hospital and the Boston City Hospital.

He retired from practice in 1922.

His Society affiliations were with the American Medical Association, the Massachusetts Medical Society, Boston Society for Medical Improvement and American Society for the Control of Cancer of which he was at one time vice-president and chairman of the board of directors. He was also a member and past president of the American Gynecological Society and the Obstetrical Society of Boston.

His clubs were the Tavern Club of Boston and the Harvard Faculty Club.

He is survived by his widow, the former Harriet Wolcott Parker, of Boston; two sons, Edward Reynolds, Jr., of New York, and Dr. George P. Reynolds, of Boston; a brother, Paul E. Reynolds, of New York, and three sisters, Mrs. William N. Bullard, of Boston and Lenox; Mrs. N. P. T. Burke, of Dover, and Mrs. Julian L. Coolidge.

BLANCHARD — William Bradford Blanchard, M.D., of 247 Concord Street, Framingham, Massachusetts, died at the Palmer Memorial Hospital, October 16, 1936.

Dr. Blanchard was born in 1880, graduated from the University of Maryland School of Medicine and College of Physicians and Surgeons in 1914. He had devoted his practice to ophthalmology, otology, laryngology and rhinology.

During the World War he was a lieutenant in the United States Medical Corps. He joined the Massachusetts Medical Society in 1923 and was also a Fellow of the American Medical Association.

COBB — Frederic Codman Cobb, M.D., a retired physician of Gloucester, Massachusetts, and Bradenton, Florida, died October 11, 1936, at the Baker Memorial Hospital in Boston.

Dr. Cobb was born in 1860 and graduated from the Harvard Medical School in 1887.

He joined the Massachusetts Medical Society in 1889 and retired in 1925.

NOTICES

RESOLUTION RECOMMENDING THE APPROPRIATION OF ADEQUATE FUNDS FOR THE MAINTENANCE AND GROWTH OF THE ARMY MEDICAL LIBRARY'S BOOK COLLECTION AND *INDEX-CATALOGUE*

The Medical Library Association, comprising two hundred of the medical libraries of the United States and Canada, assembled in its thirty-eighth annual session in St. Paul, June 22, 1936, notes with pleasure and pride the appearance of volume one of the Fourth Series of the *Index-catalogue* of the Library of the Surgeon-General's Office, United States Army (Army Medical Library). The Association records with satisfaction the abbreviations and changes in composition in this new volume effecting a saving of twenty per cent in space with accompanying reduction in cost.

After a delay of three years during which no volumes of this *Catolague* were printed, the appearance of this first volume of the Fourth Series gives renewed assurance of the continuation of this publication, which, together with the Army Medical Library, is considered the outstanding contribution which our country and its Government has made to medical knowledge, and

Whereas, The value and usefulness of the *Index-catalogue* is dependent upon the completeness of the files of medical publications contained in the Library of the Surgeon-General's Office—a public, national, medical library, the greatest in the world, serving in its present form of administration with satisfaction the medical profession and the medical libraries of our country, and

Whereas, In recent years the annual appropriation of the Congress has been wholly inadequate to provide sufficient funds to acquire the current medical books and periodicals issued throughout the world, so that they might be available for use throughout the country and for inclusion in the *Index-catalogue*,

Therefore Be It Resolved, That the Medical Library Association urges the Congress to appropriate annually to the Library of the Surgeon-General's Office an adequate sum for current medical books and periodicals and for the purchase of back publications lost during those recent years when the amount granted was grossly inadequate, thus depreciating the completeness and usefulness of the

Library's collection; and an additional sufficient sum annually, for as many years as may be required, in order to make for the greatest possible completeness of the collection and its *Catalogue;* and

Be It Further Resolved, That a sum be appropriated annually to defray the cost of printing regularly each year not less than one volume of the *Index-catalogue*, and

Be It Further Resolved, That a copy of these resolutions be spread upon the minutes of the annual meeting of this Association and sent to the President of the United States, the presiding officer of both houses of Congress, the Secretary of War, the Surgeon-General of the Army, and to the national, state, and other medical periodicals with a request for publication, and to the members of this Association, urging the organization of which they are a part and all other medical associations and institutions to adopt similar resolutions to be sent to their local members of Congress requesting their support of these measures. — Minutes of the Thirty-Eighth Annual Meeting, Session of June 22, 1936. *Bulletin of the Medical Library Association.* Vol. 25: No. 1, 12 (September) 1936.

EXAMINATION OF STOOLS FOR AMEBIASIS

For many years the Department of Tropical Medicine of the Harvard Medical School has been making examination of the feces for pathogenic amebae when requested to do so by a physician. These examinations have been performed, in recent years, by Dr. L. R. Cleveland as protozoölogist of the Department. Now, however, Dr. Cleveland has been transferred to the Harvard Biological Institute at Cambridge. He will continue to make examinations and reports there, but, for the convenience of Boston physicians, the Department of Tropical Medicine has requested the Department of Comparative Pathology to continue the same kind of service at the Medical School. The work will be performed there in Building E[II], Room 334, by Dr. Quentin M. Geiman, Assistant in Comparative Pathology.

RICHARD P. STRONG.

DOCTORS BEWARE!

A report has been submitted to this *Journal* that doctors have been interviewed by an alleged salesman for a concern dealing in rubber goods. This man is reported to have collected money and not to have carried through his agreement with respect to the goods ordered.

MEDICAL CLINIC AT THE PETER BENT BRIGHAM HOSPITAL

At 3:30 p. m. on Thursday, October 29, in the Amphitheatre of the Peter Bent Brigham Hospital, Dr. Joseph C. Aub, Associate Professor of Medicine, Harvard Medical School and Senior Associate in Medicine, Peter Bent Brigham Hospital, will give a medical clinic. To it are cordially invited practitioners and medical students.

THE APPOINTMENT OF DR. ARTHUR BERK

Dr. Arthur Berk of 270 Commonwealth Avenue, Boston, has been appointed to the position of Assistant Professor in Psychiatry at the Tufts College Medical School.

UNIVERSITY EXTENSION COURSES

The following courses in mental hygiene will be given this fall under the joint auspices of the Massachusetts Society for Mental Hygiene and the State Division of University Extensions:

BOSTON

Keeping Mentally Fit.

At the Gardner Auditorium, State House, on Thursdays at 7:45 p. m., beginning November 12. This course will consist of eight lectures by men and women of high standing in their respective fields.

CAMBRIDGE

The Psychology of Adolescence.

At Harvard Hall, on Mondays at 7:45 p. m., beginning November 2, Dr. Milton E. Kirkpatrick, Director of the Worcester Child Guidance Clinic, and Dr. Henry B. Elkind, Medical Director of the Society, will give four lectures each. While this course is primarily for teachers, those interested in the subject may attend.

SPRINGFIELD

Mental Hygiene in the Classroom.

At the Classical High School, on Wednesdays at 7:30 p. m., beginning November 4. This is the professional course for teachers given by Dr. Elkind and Miss Henderson for the last two or three years. It is based largely on case discussion and is planned to give the teacher a better understanding of the behavior problems in her classroom.

Registration for any of these courses may be made at the first meeting or in advance at the office of the Division of University Extension, 217 State House, Boston.

NOTICES OF MEETINGS

MASSACHUSETTS SOCIETY OF EXAMINING PHYSICIANS

Massachusetts Society of Examining Physicians, Fall Meeting, Copley-Plaza Hotel, Boston, Thursday, October 29. Dinner at 6:30 p. m. $2.50 per plate.

Dr. Cassius H. Watson, of New York, Medical Director of the American Telephone and Telegraph Company, and President of the National Safety Council, will speak on "Medical Aspects of Accident Control." Discussion will be opened by Dr. Charles E. Mongan, President of the Massachusetts Medical Society.

B. A. GODVIN, M.D., *President,*
WM. P. COUES, M.D., *Secretary.*

HARVARD MEDICAL SOCIETY

The next meeting of the Harvard Medical Society will be held in the Peter Bent Brigham Hospital Amphitheatre (Shattuck Street Entrance), Tuesday evening, October 27, at 8:15 p. m.

PROGRAM

Presentation of Cases.

Cases of Attempted Suicide in a General Hospital. By Merrill Moore, M.D., Associate in Psychiatry, Harvard Medical School.

Medical students and physicians are cordially invited to attend.

MARSHALL N. FULTON, M.D., *Secretary.*

TRUDEAU SOCIETY

FALL MEETING—NEW ENGLAND DEACONESS HOSPITAL
THURSDAY, OCTOBER 29, 1936

Symposium on Nontuberculous Diseases of the Chest

Operative Clinic:

2:00 p. m. Drs. Overholt, Betts and Eversole.
4:00 p. m. Dr. Hoover—Lung Abscess.
4:15 p. m. Dr. Betts—Bronchiectasis.
4:30 p. m. Dr. Souders — Intrathoracic Tumors, Nonradiosensitive.
4:45 p. m. Dr. Hare—Tumors, Radiosensitive.
5:00 p. m. Dr. Lahey—Intrathoracic Goitre.
5:15 p. m. Dr. Eversole—Anesthetic Problems in Thoracic Surgery.
5:30 p. m. Dr. Overholt — Lobectomy and Pneumonectomy.

Demonstrations. 5:45 p. m.:

Oxygen-Therapy.
Indirect Bronchoscope.
Continuous Suction for Chest Wounds or Spontaneous Pneumothorax.

6:30 p. m. Dinner Palmer Roof.

MOSES J. STONE, M.D., *Secretary.*

BOSTON PATHOLOGICAL SOCIETY

The October Meeting of the Boston Pathological Society will be held on Wednesday, October 28, at 8 o'clock, in the Harvard Medical School, Amphitheater, Building D.

The speaker will be Dr. E. A. Codman. His subject: "A Study of the Cases in the Registry of Bone Sarcoma of Giant Cell Tumor about the Knee." (X-rays will be on view in Room 202 after the meeting.)

Medical students and physicians are cordially invited to attend.

SIDNEY C. DALRYMPLE, M.D., *Secretary.*

SOUTHERN MEDICAL ASSOCIATION

The thirtieth annual meeting of the Southern Medical Association will be held at Baltimore, Maryland, Tuesday, Wednesday, Thursday and Friday, November 17-20.

Physicians from the East, white members in good standing of their state medical societies, are most cordially invited to attend the Baltimore meeting as visitors. All scientific and social activities are available to registered visitors. No registration fee.

Any physician who would like to have a complete program may secure one by applying to the Southern Medical Association, Empire Building, Birmingham, Alabama.

MASSACHUSETTS SOCIETY FOR MENTAL HYGIENE

ANNUAL MEETING

The Annual Meeting of the Society will be held on Tuesday, November 24, at the Twentieth Century Club, 3 Joy Street, Boston, beginning with a luncheon at one o'clock.

Dr. Helen MacMurchy, formerly Director of the Division of Child Welfare of the Federal Department of Health, Ottawa, will be the principal speaker and will discuss "Mental Hygiene and Child Welfare."

HEALTH DEVELOPMENTS IN MASSACHUSETTS

"Health Developments in Massachusetts under the Social Security Program" will be discussed at a meeting arranged by the Massachusetts Central Health Council, to be held during the Massachusetts Conference of Social Work, on Saturday, November 7, at the Hotel Statler, at 10 a. m. The speakers and their topics will be as follows: Massachusetts Health Program Development, by Dr. Henry D. Chadwick, State Commissioner of Public Health. The Child Hygiene Program, by Dr. M. Luise Diez, Director, Division of Child Hygiene. The Program for Crippled Children, by Dr. Edward G. Huber, Assistant Director, Division of Administration.

SOCIETY MEETINGS, CONGRESSES AND CONFERENCES

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING MONDAY, OCTOBER 26, 1936

Tuesday, October 27—

*9 a. m. - 10 a. m. Boston Dispensary, 25 Bennet Street, Boston. The Use of the X-Ray in the Diagnosis of Pulmonary Silicosis and Asbestosis. Dr. A. W. George. Medical Aspects. Dr. Robert B. Hunt.

*8:15 p. m. Harvard Medical Society. Peter Bent Brigham Hospital Amphitheater (Shattuck Street Entrance).

Wednesday, October 28—

*9 a. m. - 10 a. m. Boston Dispensary, 25 Bennet Street, Boston. Hospital Case Presentation. Dr. S. J. Thannhauser.

†12 m. Clinico-Pathological Conference. Children's Hospital Amphitheater.

*8 p. m. Boston Pathological Society. Harvard Medical School, Amphitheater, Building D.

Thursday, October 29—

*9 a. m. - 10 a. m. Boston Dispensary, 25 Bennet Street, Boston. Some Recent Work in Diabetes Mellitus. Dr. E. A. Grossman.

2 p. m. - 6:30 p. m. Trudeau Society. New England Deaconess Hospital.

*3:30 p. m. Medical Clinic, Peter Bent Brigham Hospital. Dr. Joseph C. Aub.

6:30 p. m. Massachusetts Society of Examining Physicians. Copley Plaza Hotel.

Friday, October 30—

*9 a. m. - 10 a. m. Boston Dispensary, 25 Bennet Street, Boston. Parathyroid Disease. Dr. Fuller Albright.

12 m. Massachusetts General Hospital. Clinical Meeting of the Staff of the Children's Medical Service. Ether Dome.

Saturday, October 31—

*9 a. m. - 10 a. m. Boston Dispensary, 25 Bennet Street, Boston. Hospital Case Presentation. Dr. S. J. Thannhauser.

*10 a. m. - 12 m. Staff Rounds at the Peter Bent Brigham Hospital. Conducted by Dr. Henry A. Christian.

*Open to the medical profession.
†Open to Fellows of the Massachusetts Medical Society.

October 22—Massachusetts Medical Benevolent Society, Annual Meeting. See page 691, issue of October 8.

October 27—Harvard Medical Society. See page 803.

October 28—Boston Pathological Society. See page 803.

October 29—Medical Clinic, Peter Bent Brigham Hospital. See page 802.

October 29—Massachusetts Society of Examining Physicians. See page 802.

October 29—Trudeau Society. See page 803.

November 6—William Harvey Society, Beth Israel Hospital Auditorium, 8 p. m.

November 7—Health Developments in Massachusetts. See page 803.

November 12—Pentucket Association of Physicians. Hotel Bartlett, 95 Main Street, Haverhill, at 8:30 p. m.

November 16—One hundredth anniversary of the founding of the Army Medical Library, 7th Street and Independence Avenue, S. W., Washington, D. C.

November 17-20—Southern Medical Association. See page 803.

November 24—Massachusetts Society for Mental Hygiene. See page 803.

December 3-5—Annual Conference of the National Society for the Prevention of Blindness, Columbus, Ohio.

March 30 - April 2, 1937—First International Conference on Fever Therapy. Postponement notice. See page 52, issue of July 2.

April 21-24, 1937—American Society for Experimental Pathology. See page 1075, issue of May 21.

DISTRICT MEDICAL SOCIETIES

FRANKLIN DISTRICT MEDICAL SOCIETY

Will meet at the Weldon in Greenfield at 11 a. m. the second Tuesdays of November, January, March and May.

CHARLES MOLINE, M.D., Secretary.
Sunderland.

HAMPDEN DISTRICT MEDICAL SOCIETY

November 5—Censors meet for the examination of candidates at the Springfield Academy of Medicine, 20 Maple Street, Springfield, 4 p. m.

MIDDLESEX EAST DISTRICT MEDICAL SOCIETY

November 18—Bear Hill Golf Club, Stoneham.

January 13, 1937—Bear Hill Golf Club, Stoneham.

March 16, 1937—Danvers State Hospital, Danvers.

May 11, 1937—Bear Hill Golf Club, Stoneham.

KENNETH L. MACLACHLAN, M.D., Secretary.
1 Bellevue Avenue, Melrose.

NORFOLK DISTRICT MEDICAL SOCIETY

October 27—Meeting will be held at St. Elizabeth's Hospital, Brighton, 8 p. m.

November 5—The Censors will meet for the examination of candidates. Fee of $10.00 is payable at the time of examination. Application blanks may be obtained by writing the Secretary, furnishing name, address and name of school of graduation in medicine. Candidates whose applications are on file will receive proper notices.

November 24—8:15 p. m. The Beth Israel Hospital. Communications and Case Presentations by the Staff. Principal subject—Cardiology. Details of program to be announced.

January 19, 1937—8:15 p. m. The Peter Bent Brigham Hospital. Communications and Case Presentations by the Staff. Suggested title—"Abdominal Pain from the Medical and Surgical Standpoint." Details of program to be announced.

February 23, 1937—Time, place and details of program to be announced.

March 30, 1937—8:15 p. m. New England Deaconess Hospital. A Symposium on Diabetes entitled "A Survey of the Diabetic Work of the George F. Baker Clinic in the New England Deaconess Hospital." Communications and Case Presentations by the Staff. Drs. Elliott P. Joslin, Howard F. Root, Priscilla White, Alexander Marble and Allen P. Joslin.

May, 1937—Annual Meeting. Details to be announced.

The Secretary on behalf of the Society and its Executive Committee desires to express appreciation to the Physicians, Surgeons, Hospital Executives and others who have so kindly consented to assist us in connection with the above program.

FRANK S. CRUICKSHANK, M.D., Secretary.
1247 Beacon Street, Brookline.

PLYMOUTH DISTRICT MEDICAL SOCIETY

November 19—6 p. m. Goddard Hospital.

January 21, 1937—11 a. m. Bridgewater State Farm.

March 18, 1937—11 a. m. Brockton Hospital.

April 15, 1937—Annual Meeting. 11 a. m. Ducy Hospital.

May 20, 1937—11 a. m. Lakeville State Sanatorium.

FRED F. WEINER, M.D., Secretary.
231 Main Street, Brockton.

SUFFOLK DISTRICT MEDICAL SOCIETY

October 28—Stated Meeting. Boston Medical Library. 8:15 p. m. "Report on a Study of Maternal Mortality in Boston Made by the Obstetrical Society of Boston and the Boston City Department of Health." Dr. Robert L. DeNormandie. Discussion: Dr. Charles F. Wilinsky and Dr. John T. Williams.

November 5—Censors' Meeting. Boston Medical Library, 8 Fenway, 4 p. m.

November 18, 1936—Boston Medical Library. 8:15 p. m. "Hydrocarbons and Cancer." Dr. M. J. Shear—U. S. P. H. Service. "Cancer Research. Recent Advances in Our Knowledge of Cancer." Dr. J. C. Aub. Discussion: Dr. J. W. Schereschewsky—U. S. P. H. Service and Dr. R. B. Greenough.

January 27, 1937—Boston Medical Library. 8:15 p. m. Joint Meeting with the Boston Medical Library. "Anthropology." Dr. Carleton S. Coon.

March 31, 1937—Boston Medical Library. 8:15 p. m. "Social Insurance—It Affects the Medical Profession." Dr. Charles E. Mongan. Discussion: Dr. Channing Frothingham.

April 28, 1937—Annual Meeting. Boston Medical Library. 8:15 p. m. "Problems in Surgical Diagnosis." Dr. Howard M. Clute.

CONRAD WESSELHOEFT, M.D., President,
CHARLES C. LUND, M.D., Secretary.

WORCESTER DISTRICT MEDICAL SOCIETY

November 5—At 4:30, in the rooms of the Worcester Medical Library, Inc., at 34 Elm Street, Worcester, will be held the fall Censors' meeting.

November 11—Grafton State Hospital, North Grafton, Mass. 6:15 p. m.: Dinner—complimentary by the hospital. 7:30 p. m.: Business session and scientific program.

December 9—St. Vincent Hospital, Worcester, Mass. 6:15 p. m.: Dinner—complimentary by the hospital. 7:30 p. m.: Business session and scientific program.

January 13, 1937—Worcester City Hospital, Worcester, Mass. 6:15 p. m.: Dinner—complimentary by the hospital. 7:30 p. m.: Business session and scientific program.

February 10, 1937—Worcester State Hospital, Worcester, Mass. 6:15 p. m.: Dinner—complimentary by the hospital. 7:30 p. m.: Business session and scientific program.

March 10, 1937—The Memorial Hospital, Worcester, Mass. 6:15 p. m.: Dinner—complimentary by the hospital. 7:30 p. m.: Business session and scientific program.

April 14, 1937—Worcester Hahnemann Hospital, Worcester, Mass. 6:15 p. m.: Dinner—complimentary by the hospital. 7:30 p. m.: Business session and scientific program.

May 6, 1937—At 4:30 in the rooms of the Worcester Medical Library, Inc., at 34 Elm Street, Worcester, will be held the spring meeting of the Board of Censors.

Wednesday Afternoon and Evening, May 12, 1937—Annual Meeting. Time and place for this meeting will be announced in an early spring issue of the Journal.

ERWIN C. MILLER, M.D., Secretary.
27 Elm Street, Worcester.

WORCESTER NORTH DISTRICT MEDICAL SOCIETY

October 28—Meeting at the State Colony, Gardner, 4:30 p. m.